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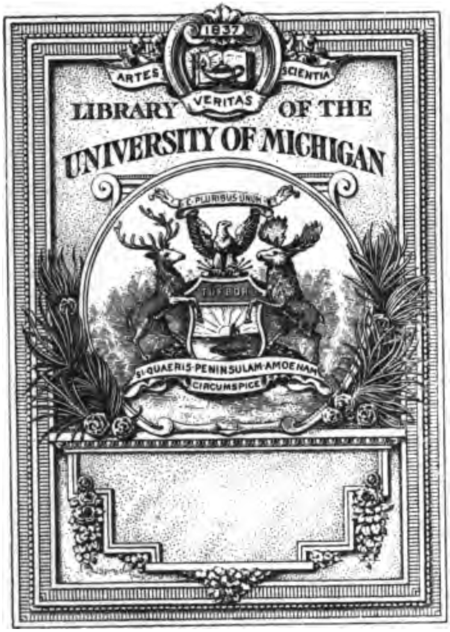
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A
MANUAL
OF THE
LAND AND FRESH-WATER SHELLS
OF
The British Islands,

WITH
FIGURES OF EACH OF THE KINDS.

BY
WILLIAM TURTON, M.D.

A New Edition,
THOROUGHLY REVISED AND MUCH ENLARGED,
BY
JOHN EDWARD GRAY, F.R.S., &c.

LONDON:
PRINTED FOR
LONGMAN, ORME, BROWN, GREEN, AND LONGMANS,
PATERNOSTER-ROW.
1840.

"Nothing can be unworthy of being investigated by man, which was thought worthy of being created by God." — BOYLE.

"Divine communications are alike vouchsafed to us by the Volume of Nature, and the pages of inspiration." — BACON.

LONDON:
Printed by A. SPOTTISWOODE,
New-Street-Square.

DEDICATED TO

THE MEMORY

OF

MRS. ARTHUR HILL,

OF

BRUCE CASTLE, TOTTENHAM,

AS A SLIGHT MEMORIAL OF HER GREAT WORTH,

BY

THE EDITOR.

Reclass 3-9-63 Blue

PREFACE.

THE Introduction to this edition contains, 1st, an explanation of the means which I have used to improve the work; 2dly, an account of the species which I have reason to believe had been, from various causes, erroneously introduced into works of this kind, and the grounds on which they have been here rejected; 3dly, a sketch of the geographical distribution of the species, as compared with the rest of the world, and with different parts of our own country. I fear that this part of the subject, which has been here taken up for the first time, from the poverty of the materials at my disposal, is not so perfect as it should be; but it is to be hoped, that readers living in different parts of the country (now that their observation is directed to the subject) will pay more attention to it, so that in future editions of the work it may be carried out in a more complete manner. It should be observed, that the whole value of the lists, and of the table, must depend on the accurate determination of the species, which is of the first importance; while the extent of the list (which appears to be the general pride of the local collector) is of a very secondary consideration. Since this part of the work was printed, Mr. Forbes has presented to the British

Association, at Birmingham, his Report on this subject, which (judging from the abstract of it that was read at the meeting, and has since been printed in the *Athenæum*,) will doubtless contain much additional information. The Introduction also contains, 4thly, an account of the fossil species which formerly inhabited this country; 5thly, the situations generally preferred by different species of shells; 6thly, an outline of the history of the various additions that have been made, from time to time, in this part of our Fauna; and, lastly, a catalogue of the works and papers which treat on British land and fresh-water mollusca, and of the best works on European species.

For the purpose of assisting the young student, or those who study the mere shell, without paying any attention to the animals that form them, an artificial table of the genera has been framed, and to it is appended a definition of the more important and general terms used in the description of shells; some of which have, until lately, been employed in different senses by even celebrated authors. The description of the species is preceded by a general outline of the distribution of molluscous animals; and the genera have been distributed into natural families from characters taken from the consideration of the animal, which alone can be regarded as the proper subject for classification. Every day proves, to the scientific conchologist, that every modification in the structure of the animal impresses its character on the shell, and that the shells thus afford good subsidiary characters for the distinction of groups.

In the observations appended to the characters of groups and species, there is added, as opportunities occurred, a physiological account of the mode of formation and structure of the different parts of shells.* It is to this part of the subject that I would especially direct the attention of my readers; as, in the study of the structure, formation, developement, and colouring of the shells, and in the habits of the animals which form them, they will find a never-failing source of pleasure and instruction, which can be carried on without any expense. For these particulars are as easily to be observed in the most common snail, as in the finest and most expensive shells in the cabinets of the curious; and the details are more easily followed out, from the very fact of the facility of observing many specimens at the same time, in different states of developement: so that, to the philosophical conchologist and reflecting student, the most common specimens may do more to illustrate the perfection and all-seeing wisdom of the Creator, than the most costly collection. In the description of the species, particular attention has been paid to dividing them into small groups, to facilitate their determination; and an attempt has been made to point out the different varieties that occur, not by describing each individual variety that may be found, but by indicating the points that have been observed to be most liable to variation, and also the monstrosities which, from the mode of formation of the shell, and some peculiarities in the habit of the different species, are likely to take place in each of them. To illustrate the animals of the different families and genera, a series of vignettes has been given; and further to assist in determining the species, some wood-cut figures of the shells have been interspersed in the text.

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* For a larger exposition of my views on this subject, reference should be made to papers published in the *Philosophical Transactions* for 1833, and in the first volume of the *Zoological Journal*.

All the new species introduced into the work, and the more remarkable varieties, have been figured, and added to the plates (except *Vertigo angustior*, which could not be procured); and the whole of the figures which were given in the former edition have been compared with the specimens, and corrected where required. There have also been added to these plates other figures of the same species, and enlarged details of those parts of the smaller kinds which are calculated to facilitate the determination of the species. Indeed, although this work has been called in the titlepage a new edition of Dr. Turton's Manual, it may be almost considered a new publication, as the only portions of the former edition that have been retained are the descriptions of the species, and a few of the general observations; in so much that, on revising it in its printed form, it is a matter of regret to me, that it was not rather undertaken as an entirely new work, which would not have cost me nearly so much trouble as editing the present one.

I have only further to return my thanks for the kind and friendly assistance which I have received from Mr. Jeffreys, Mr. Hincks, Mr. Philip Carpenter, Mr. D. Cooper, Mr. Carter, and especially from Mr. Thompson of Belfast, and Mr. Alder of Newcastle, who have kindly sent me specimens for comparison and figuring. Some apology is, perhaps, due to those who have been expecting the new edition of the work which has been so long advertised: this has partly been occasioned by the delay in the completion of the plates, and partly by numerous engagements, which have only allowed me to pay attention to the subject at leisure moments, when not occupied by my official duties.

Eliot Vale, Blackheath,
Feb. 12. 1840.

ERRATA.

Page 12. line 21. add "t. 6. f. 69."
79. line 6. omit "on."
90, 91. 93, 94. 97, and 98. for "t. 8" read "t. 10."
127. line 19. add "t. 11. f. 129."
133. line 3. add "t. 11. f. 130."
135. line 5. for "f. 24." read "f. 34."
139. line 7. for "31." read "t. 11. f. 131."
175. line 22. for "t. 4. f. 39." read "t. 12. f. 138."
200. line 28. for "t. 140. f. 10." read "t. 12. f. 140."
205. at bottom, erase "f. 142."
221. line 20. add "(t. 7. f. 77.)"
227. line 26. add "t. 12. f. 146."
234. add to var. "t. ~~1~~9 f. 101." *a. b. d.*
239. line 4. for "pulustris," read "p*a*lustris."

N. B. As the plates were not returned from the engraver until the greater part of the text was printed, there are unfortunately the above errors in the references to the figures in the text, and a few references to them have been left out; but these can be easily added by the pen, space having been left for the purpose.

A MANUAL

OF THE

LAND AND FRESH-WATER MOLLUSCA

OF

THE BRITISH ISLANDS.

INTRODUCTION.

THE great attention paid to the British land and fresh-water shells by Montagu; by my late friend and teacher in zoology, Dr. Leach; and more recently by Mr. Jeffreys, Mr. Jenyns, and Mr. Alder (more especially the latter), has left me little else to do, in revising this edition, than to embody their observations. This is the more peculiarly the case, inasmuch as they all, in a great measure, worked from the collection now under my charge, which contains the materials used by Dr. Leach in preparing his as yet unedited work on British Mollusca, and, among the rest, the various specimens which I had myself collected when actively engaged in the study of our British species. It is right, however, to add, that, before adopting the remarks of these authors, I have, in every instance where it was in my power (and that was almost universally), verified the facts myself; and, therefore, although I have used their words, from a desire to do justice to their labours, the conclusions are most frequently equally my own.

In determining the names of the species, I have always acted on the only certain and just rule, — that of priority, — unless the name first used was decidedly objectionable, on account of its giving an incorrect idea. In so doing, I have been obliged to change some of the names employed by Mr. Alder and Mr. Jeffreys, who, from a desire to make our Fauna agree with the continental works which they have studied, have been induced to adopt several of the names given by French authors, although long posterior to those applied to the same species by our own most accurate observer and describer, Montagu. The work of this excellent zoologist (when we consider the period of its publication, and the difficulties which the author had to encounter from the prejudices then in force) deserves to be placed in a very high rank; and the marked attention which he paid to the animals of the species that had come under his observation proves that his views were far superior to those of his age. Mr. Alder gives as his reason for adopting these more modern French names in preference, that they are almost exclusively used on the Continent — by which, I presume, he means in France; for, if we study the works published in different European countries, and especially their Faunas, we shall find that each of them has its own peculiar favourite, whose arrangement and nomenclature the naturalists of that country are most inclined to adopt. Thus, though the names given by Draparnaud are commonly used in France, those of Müller are almost exclusively adopted in Germany and Sweden; and the authors of the latter countries would as readily have adopted the names of Montagu as those of Draparnaud, if they had been acquainted with the work of the former, which, it should be recollected, was published at a period when we were excluded from the Continent by an unhappy war.

It ought to be, and, judging from the attention which our botanists and zoologists pay to continental works, I believe it is, the desire of the naturalists of this country to give to each author his just due, let him belong to what country he may; and, eventually, this high position must be taken even by those (if any such there be) who are now restricted by narrow national prejudices from consulting the works of their contemporaries in other countries. It is these considerations which have induced me to take the course I have adopted. I believe, moreover, that if I had followed that recommended by Mr. Alder and Mr. Jeffreys, I should have experienced continual difficulties in determining whether the name of a species used by German or French authors was the most generally adopted; and this difficulty would have gone on daily increasing, inasmuch as the Germans are paying more and more attention to natural science, and their language is becoming more generally studied in this country.

A short description of the animals, and a few notes on their habits, have been added; and this new feature in the work might have been greatly extended, had it not been feared to add too much to its bulk.

Great care has been taken in correcting such false impressions as may have been produced by oversights in the works of preceding English writers on the subject, and reference has been made to such of their observations as have appeared to be of sufficient importance to find a place in a work which is intended only as a manual for the student. One animal of each of the more typical genera of each of the families has been figured, and new plates have been added, containing the species not before figured, together with figures and details of some of the smaller species, which were not executed so well as might have been wished in the preceding edition.

Wishing to make the work really what its title represents it, the species described are restricted to those which appear to be truly native, and only the two following, viz.—

Testacella haliotoidea, t. 3. f. 19., and
Driessina polymorpha,

have been admitted among those which are supposed to have been introduced in modern times. These have been admitted, because they have become truly naturalised, and propagate themselves in our climate in the open air. Indeed it is doubtful whether the first of them may not be as truly native as several other species commonly considered so; such as, *Helix Pomatia*, *H. holosericea*, *H. limbata*, *H. Carthusiana*, and *H. Pisana*. Several other species were recorded and described in the first edition of this work, which have been introduced with foreign plants, either buried in the mould, or on the plants themselves, or which have most probably been brought to this country in the egg state. These are not truly acclimatised, and only propagate their species when they are kept in stoves or hot-houses; they can therefore have no pretension to be considered as natives: among them must be recorded, the

1. **TESTACELLA** *Maugei*, t. 3. f. 18.
   Testacellus Maugei *Férussac,—Turton, Man.* ed. 1. 27. f. 18.
   Testacella haliotidea *Drap.* 18. f. 46—48.
   Testacellus europæus *Montfort*, ii. 95.

A native of Teneriffe.

First noticed as having been introduced into this country by Férussac, and then by Miller of Bristol.

2. **BULIMUS** *decollatus*, t. 6. f. 60
   Helix decollata *Linn.* s. n. 1247.
   Bulimus decollatus *Drap.* 76. t. 4. f. 27, 28.; *Turton, Man.* ed. 1. 77. f. 5.; *Rossm. Icon.* f. 384.

A native of France.

Dr. Turton gives the following account of the reason why he included this shell in the British Fauna. It "was observed to breed in great abundance for many successive years in the green-house at Wotton, in South Devon, the seat of H. Studdy, Esq., lodged in the earth, under the woodwork, whence they wandered abroad in the summer. This woodwork and the earth were replaced with stone, by which the colony was lost." *Zool. Journ.* 565., and *Man.* ed. 1. 77; where, he adds, "no foreign earth was ever known to have been admitted into the house; and they were considered by the gardeners as natives. All that were preserved we owe to the diligence of Mrs. Griffiths and Miss Hill."

The nucleus or newly-hatched shell is small, subglobose, and formed of 2½ whorls. The animal elongates the shell without enlarging the size of the whorls, until it has perfected 6 or 8 whorls; it then gradually enlarges the whorls, and rather contracts them again before it has completed its 8 or 9 whorls, and forms its perfect mouth. When the animal has formed whorls enough of the tapering kind to contain that part of the body which was in the small whorls, it secretes a conical tapering septum between them and the slender ones, and the top falls off from want of connection with the animal. (This is well figured in *Philippi, Sicily*, t. 8. f. 14.)

3. Bulimus *Goodallii*, t. 6. f. 61.
   Bulimus clavulus *Turton, Man.* ed. 1. 79. f. 61.
   Helix Bulimus Goodalii *Miller, Ann. Phil.* vii. 1822, 381.
   Helix cochlicella clavulus *Férus. Prod.* 52. 381. (not described).
   Achatina clavulus *Sow. Gen.* t. f.
   B. clavulinus *Potiez, Gal.* 1. 136. t. 14. f. 9, 10.

Inhab. Guadaloupe; naturalised in Bourbon and England.

This shell was first introduced into the Fauna, and indeed first described, in 1822, by Mr. Miller, who found it in some pine-beds at Bristol; it is also common in the same situations in the neighbourhood of London, especially in Kensington Palace garden; and has been found near Manchester by Mr. Williamson. It was first observed by the late Mr. Drummond, the botanist, in 1816, who was in the habit of feeding them; and when he wanted a supply, he merely placed a flat board upon the surface of the tan, and left two or three small dead worms beneath it, and never failed of finding it covered with them in a few days. *Fleming, B. A.* 266.

To these may be added —

4. Helix *maculosa* Born. Mus. t. 14. f. 15, 16.; Férus. Moll. t. 28. f. 9, 10.
   H. irregularis *Férussac*, l. c. t. 28. f. 5—8.

A native of Northern Africa, Egypt.

Some specimens of which were living for two or three years in my house at Blackheath, and in that of my friend Mrs. Mauger, at Clapton.

5. Bulimus *zebra*.
   Buccinum zebra *Müller*.
   Bulimus undulatus *Brug. & Lam.*
   Bulla zebra *Dillw., Lister*, t. 580. f. 34. *Chemn.* ix. f. 1015, 1016.
   Helix zebra *Férussac, Moll.* t. 114. f. 58. and t. 118.
   Bul. zigzag. *Lam.* (?)

Inhab. S. America, Honduras.

Is brought with the mahogany logs, and often lives for some time in this country.

6. Bulimus *rosaceus* King, Zool. Journ. v. 341.

Inhab. S. America, Chili.

Brought by Lieut. Graves, and lived some time in Mr. Loddiges' hot-house. See *Zool. Journ.* v. 342.

7. Bulimus *oblongus* Brug.
   Helix oblongus *Müller*.
   Bulimus hæmastoma *Scopoli & Lam.*

Inhab. S. America.

A specimen of this animal lived for more than a year in the hot-houses of the Horticultural Society, and laid some eggs. *Zool. Journ.* v. 101.

8. ACHATINA *bicarinata* Lam. Hist. vi.
Bulimus bicarinatus *Brug.*
Bulla bicarinata *Dillw. Cat.* 496.; *Lister*, *C.* t. 37. f. 36.

A native of the Cape of Good Hope.

A specimen of which was given to me alive, by Capt. Sir James Alexander, who had it for some time living, and in whose possession it deposited an egg.

For the same reason no notice is taken in the body of the work of the following species, which have been included among the British, by one or more preceding authors, on what I am inclined to regard as insufficient authority.

Several of these have doubtless been introduced, by mistake, for some other nearly allied British species; and others have been described from specimens which have been accidentally intermixed with British shells in the cabinets of careless collectors; but it is also to be feared that some have been wilfully palmed upon us by unprincipled persons, who wished to gain credit for their discovery, and to enrich their cabinets with foreign species, for which they, at the same time, coined British habitats, sometimes not even consistent with their proper station. It is curious that the persons who have been most addicted to such practices often overreached themselves; for not satisfied with adding to the Fauna, species which, from their geographical distribution, might possibly be found in our island, they often fixed on such tropical shells as were most easy of access, without heeding that these must at once be excluded from our Fauna when their true locality became known.

Some of the species introduced, as I believe, by mistake, are natives of the Continent, especially of the south of Europe. Such are —

1. Vitrina *elongata* Drap. Moll.120., Pfeiffer, 48. t. 2. f. 3.
   Helicolimax elongata *Fér. Moll.* t. 9. f. 1.
   Inhab. France.
   Introduced by Mr. Jeffreys, who appears to have mistaken one of the varieties of *V. pellucida* for this shell.

2. Helicophanta *brevipes* Fér.
   Helix brevipes *Drap.* 119. t. 8. f. 30. 33., *Turton, Man.* ed. 1. 65. (f. 50.?), *Rossm. Icon.* t. 2. f. 39.
   A native of the south of Europe.
   Introduced by Dr. Turton, who afterwards thought he might have mistaken a young specimen of *Vitrina* for it; his account is chiefly taken from Draparnaud's work. The figure has not the slightest resemblance to the shell, but is probably *Helix radiatula?* According to Michaud, it is not found even in France.

3. Helix *elegans* Gmelin. 3642.
   Trochus terrestris *Pennant.*
   Carocolla elegans *Lam.*, *Kenyon*, *M. N. Hist.*
   A native of Italy, and the south of France.
   M. Férussac observes (*Journ. Phys.* 1820, 302.) that this species is not found in France to the north of Montpelier. It was said to have been found in Cumberland, by Mr. Hudson the botanist.

4. Helix *explanata* Müller, Verm. ii. 26.
   Helix albella *Drap.* not *Linn.*
   Carocolla albella *Lam.*, *Kenyon.*

Inhab. Italy and the south of France, on the shores of the Mediterranean.

Dr. Fleming inserted this in the Fauna: he says a single specimen was found, in 1810, at St. Andrews, Scotland. (*Brit. Anim.* 260.) On his authority, I inserted it in my list of new British shells, in the *Medical Repository* for 1821, p. 239.; but there can be little doubt that he was mistaken in the species.

5. HELIX *conspurcata* Drap. H. M. 105. t. 7. f. 23. 25.; Rossm. Icon. t. 26. f. 351*.; Lam. n. 104.

A native of France and Sweden.

Introduced by Mr. Jeffreys as a synonym of *H. hispida*, but it is not allied to *H. caperata* — Linn. Trans. xiii. 338. 510.

6. HELIX *Olivieri* Férussac, Prod. 255., not Pfeiffer, Jeffreys, Linn. Trans. xiii., Rossmäsler, Icon. t. 27. f. 369.

Inhab. south of Europe, Syria. (?)

Introduced by Mr. Jeffreys, who thought one of the varieties of *Helix Gibsii* was this species.

7. HELIX *candidula* Studer, Rossm. Icon. t. 26. f. 350. 353.

H. striata var. *Drap.* t. 6. f. 20., *Pfeiffer*, 4. t. 2. f. 21, 22.

Inhab. France, Germany, and Switzerland.

Introduced by Mr. Jeffreys (*Linn. Trans.* xiii.) as a synonyme of *H. caperata*. But I agree with Mr. Alder in believing that this species has not yet been found in Britain. Rossmäsler refers to Turton, *Man.* f. 21., for this species, but this is a mistake.

8. **Helix** *sylvatica* Drap. t. 6. f. 1.
H. austriaca *Rossm. Icon.* t. 1. f. 7.
H. vindebonensis *Pfeiffer.*

1

Inhab. south of France near Lyons, and Switzerland.

Introduced into the list by Mr. Kenyon. (*Mag. N. Hist.* i. 427.) Deshayes believes it is only a variety of *H. nemoralis* (Lam. H. ed. 2. 55.), but it is quite distinct.

9. **Helix** *lucorum* Linn. s. n. 1247., Müller, 46., Férus. Moll. t. 21. f. 2.
H. castanea *Olivier, Voy.* t. 17. f. *a. b.*
Helix mutata *Lam.*

A native of Italy and the Levant.

Introduced by Pulteney, who believed it was our *H. aspersa.*

10. **Helix** *cæspitum* Drap. 109. t. 6. f. 14, 15., Pfeiffer, 17. t. 6. f. 11, 12., Rossm. Icon. t. 1. f. 16., t. 36. f. 513, 514, 515 (not 516.).

A native of the south of France, Spain, and Syria.

Introduced by Mr. Jeffreys, who believed it to be the same as *H. ericetorum,* from which it differs in being rounder and higher.

11. **Helix** *neglecta* Drap. 108. t. 6. f. 12, 13., Rossm. Icon. t. 26. f. 355.

A native of the south of France, Italy, and Syria.

Introduced by Mr. Jeffreys as a variety of *H. virgata.* It is more like a variety of *H. ericetorum,* than of *H. virgata,* but is still distinct from either.

12. Helix *plebeia* Drap.

A native of France, Switzerland, and Germany.

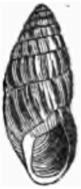
Mr. Jeffreys introduced this shell as being sometimes found with *H. concinna*, and probably another variety of *H. hispida.*

13. Bulimus *detritus* Deshayes.

Bulimus radiatus *Brug. E. M.* 312., *Drap.* 73. t. 4. f. 21., *Rossm. Icon.* t. 2. f. 42.
Helix detrita *Müller*, ii. 101.
H. sepium *Gmel.*
Bul. sepium *Hartmann*, *Lister*, *C.* t. 8. f. 2.
Helix radiata *Férus.*
Buccinum leucozonias *Gmel.*

Inhab. France and Germany.

This species was introduced into our Fauna by Baron Férussac, who considered that the *Helix detrita* of English authors must have been described from a specimen of this species, their *Helix detrita* being a tropical shell, — our *Bulimus exilis*, p. 17.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14. Bulimus *ventricosus* Drap. 78. t. 4. f. 31, 32., Rossm. Icon. t. 28. f. 377.

Helix cochlicella ventrosa *Férus. Prod.* 52. 377.

A native of the south of France, Italy, Syria, and Spain.

Introduced by Dr. Turton (*Man.* ed. 1. 86.), who believed that a variety of *Bulimus acutus*, which he had received from Cornwall, was referrible to this species. Mr. Jeffreys thought it was a variety of *H. acutus* (Linn. Trans. xiii. 347. 513.), and Rossmäsler has referred to Turton's figure without a doubt, as belonging to that species.

15. BULIMUS *pupa* Brug. E. M. 349., Rossm. Icon. t. 28. f. 379.

Pupa primitiva *Menke*, *Cat.* 34.

Pupa normalis *Menke*, *MSS.*

Bulimus tuberculatus *Turton*, *Zool. Journ.* 363. t. 13. f. 4., *Man.* ed. i. 82. f. 64.

Helix pupa *Dillwyn*, 960.

Inhab. Sicily, Italy, and North Africa.

Introduced by Dr. Turton on the authority of Capt. Blomer, who stated that he found it in a wood about Pershore, Worcestershire; but he has since doubted the accuracy of this information (*Man.* ed. i. 142.), and M. Férussac says that it has never been found within 15 degrees of Britain.

16. PUPA *cinerea* Drap. 65. t. 3. f. 53, 54., Rossm. t. 23. f. 336.

Bulimus similis *Brug. E. M.* 96.

Turbo quinquedentatus *Dillwyn*.

Inhab. south of France, Italy, Switzerland, and South Germany.

Introduced, in error, by myself, a specimen of this shell having been accidentally mixed by Dr. Leach with some specimens of other shells which I had collected at Battersea. Mr. Jeffreys has thought that he also had discovered a fragment of this species in the same locality, but this, too, is probably an error, like some of the other habitats of doubtful species in the same paper, which the author afterwards corrected.

17. PUPA *tridens* Drap. 68. t. 3. f. 57., Brard, t. 3. f. 11., Rossm. Icon. t. 2. f. 23.

Bulimus tridens *Brug. E. M.* 90.

Turbo tridens *Gmel.*

T. quadridens *Alten.*
P. tridentata *Brard.*

Inhab. the continent of Europe.

Introduced, by mistake, by Baron Férussac, who considered it the same as *Turbo tridens* of the English authors. *Journ. de Phys.* 1821, p. 295.

18. Pupa *obtusa* Drap. 63. t. 3. f. 44., Rossm. Icon. 19. t. 23. f. 337.
Pupa germanica *Lam.* vi. 108.
Cochlostyla obtusa *Férus. P.* 48. t. 109. f. 4.

A native of France and the Alps.

Dr. Fleming (*Brit. Anim.* i. 269.) mistook the *P. alpestris* of Férussac for this species.

19. Clausilia *labiata* Turton, Man. ed. 1. f. 57.
Turbo labiatus *Solander, Montag. T. B.* 363.
Clausilia solida *Drap.* 7. t. 4. f. 15., *Rossm. Icon.* t. 18. f. 267.
Strombiformis perversus *Dacosta,* 107. t. 8. f. 15.

Inhab. France (?), Malta.

Introduced by Dacosta. It is said to have been found at Battersea and in Hyde Park in 1790, by the late Mr. Swainson: most probably it was carelessly placed in the cabinet for *C. laminosa,* which is common in these localities.

3

20. Clausilia *papillaris* Drap. t. 4. f. 13.; Rossm. Icon. t. 12. f. 169.
Clausilia bidens *Turton, Man.* ed. 1. f. 56.
Bulimus papillaris *Brug.* 49.
Helix papillaris *Müller,* ii. 120.
Turbo bidens *Lin. Gmel.* 3069.

Inhab. Sicily.

Mr. Forbes furnished Mr. Alder with the following account of the introduction of this species into the Fauna. He says, "I have lately obtained a manuscript copy of Laskey's North British Testacea, written by himself, which fully explains the history of the British *Clausilia papillaris.* He states, that it was found by him in Granton Park, near Edinburgh, and that it was imported from abroad, in moss round the roots of some exotics."

Nilson gives this as a Swedish species, but probably his shell is our *Clausilia biplicata,* for that and many other species have whitish spots near the suture.

21. Clausilia *ventricosa* Drap. t. 3. f. 14., Rossm. Icon. t. 7. f. 102.

4

Clausilia biplicata has been mistaken for this species. Rossmäsler thought that Turton's figure 57. represented it.

22. Achatina *folliculus* Lam. vi.; Michaud, Compl. 53. t. 15. f. 14, 15.

Helix folliculus *Gmel.* 3654.

Helix gracilis *Lowe Mol. Mad.* 61. t. 6. f. 28. (?)

Young H. cochlitoma folliculus *Férussac, Bull. Zool.* i. 7.

Physa scaturiginum *Drap.* 56. t. 3. f. 14, 15.

Lymneus scaturiginum *Turton, Man.* ed. 1. f. 104.

Inhab. south of France, Sicily, under stones, &c.

Dr. Turton, according to the remarks of Dr. Fleming (*B. A.* 274.), Mr. Jeffreys, and Mr. Alder, mistook the young of *Lymneus glaber,* according to the first, and *L. stagnalis,* according to the two latter, for the young of this species, probably misled by Draparnaud, who had called it a *Physa.* How Draparnaud could have done so, I do not know, for it is a dextral shell (as is also the specimen figured by Turton, f. 104.), who referred it to Lymneus.

23. Diastropha *contorta.*

Physa contorta *Michaud, Bull. Lin. Soc. Bord.* iii. 368. t. f. 15, 16., *Comp.* t. 16. f. 21, 22.

Physa alba *Turton, Zool. Journ.* ii. 361., *Man.* ed. 1. f. 111.

Physa rivularis *Philippi,* 146. t. 9. f. 1.

Inhab. Sicily, Corsica, Algiers, and the Pyrenees.

Introduced into the Fauna by Dr. Turton, on the same authority as *Bulimus pupa,* with about as much probability. Dr. Fleming does not think it distinguishable from *Ph. fontinalis;* probably he had not seen a specimen.

24. Physa *acuta* Drap. 55. t. 3. f. 10, 11., Brard, Conch. 169. t. 7. f. 5, 6.

Inhab. France, Italy, and Sicily.

This shell is introduced on the authority of Mr. James D. C. Sowerby, who believes it was found in Wales. Lamarck refers to *Lister, Ang.* t. 2. f. 25., for this species.

25. Planorbis *lutescens* Lam. Hist. vi. 153.

Inhab. France.

Introduced by Mr. Jeffreys, who thought his *P. disciformis* was this species.

26. Cyclostoma *ferrugineum* Lam., Rossm. t. 28. f. 396., Potiez, Gal. 1. 236. t. 24. f. 7, 8.

Cyclost. productum *Turton, Man.* ed. 1. 94. f. 76.

Turbo fulvus *Wood, Cat. Supp.* t. 6. f. 9.

Inhab. Minorca, Algiers.

Introduced by Dr. Turton, who figures it for the next species. He says he found a single specimen near the sea-coast in the West of Ireland!

27. Cyclostoma *sulcatum* Drap. 33. t. 13. f. 1. (not Lam. n. 4.); Rossm. Icon. t. 28. f. 304.

Inhab. Provence, South Italy, and Sicily.

Introduced with doubt by Dr. Turton (*Man.* ed. 1. 94.), who believed that it was the foregoing species. Deshayes refers to Turton (*Man.* fig. 76.) for this species.

28. Valvata *minuta* Drap. 12. t. 1. f. 36, 37, 38.

Inhab. France.

Mr. Miller (*Annals of Phil.* iii. 377.) introduced this species as found near Bristol, from two dead shells!

29. Valvata *spinorbis* Drap. 41. t. 1. f. 32, 33.

Inhab. France.

Turton introduced this species in the *Manual.* See Mr. Alder's remark on it at *Valvata cristata.*

30. Cyclas *lacustris* Drap. 130. t. 10. f. 6. 7., Turton, Man. ed. 1. 14. t. 1. f. 4.

Inhab. France.

Mr. Miller and Dr. Turton give this as a British species; the latter copies Draparnaud's description and figure. Mr. Alder informs me that the specimens which Dr. Turton described are only a variety of *Cyclas calyculata.* Mr. Alder observes, that the *Cyclas lacustris* of Draparnaud is certainly unknown to British naturalists; but as the species is described by most of the continental authors, we might conclude that they were well acquainted with it. The contrary, however, appears to be the fact. M. de Férussac, who, from his extensive correspondence, might have been expected to possess the best information on the subject, gave Mr. Alder a variety of *C. cornea* (frequently found in this country), as the supposed *C. lacustris* Drap. This, though slightly rhomboidal in outline, does not agree very well with Draparnaud's description. Mr. Clark has a shell obtained in Devonshire, which comes nearer to it.

The following introduced species are only found in tropical climates: —

1. ACHATINA *octona* Turton Man. ed. 1. f. 72.
Cionella elongata *Jeffreys, Linn. Trans.* xiii. 349.
Bulimus octonus *Brug. E. M.*, — *Chemn.* ix. f. 1264.

Inhab. the West Indies, St. Vincent's.

Placed in the list by Dr. Pulteney, probably by mistake for *Lymneus glaber*. Mr. Jeffreys (*Linn. Trans.* xvi. 349.) believed he had rediscovered this tropical species, but at length gave it up. Montagu doubted its being British. (*T. B.* 307.)

2. BULIMUS *exilis* Deshayes.—f. 109.
Bulimus guadalupensis *Brug.*, *Lam.*
Helix acuta *Chemn.* ix. f. 1124.
Helix guadalupensis *Dillw.*, *Férussac.*
Bulimus antiguensis *Guild. MSS.*
Helix detritus *Montag. T. B.*
Lymneus detritus *Turton*, *Man.* ed. 1. f. 109.
Bulimulus trifasciatus *Leach*, *Zool. Misc.*
Bulimulus acutus *Leach MSS.*
Helix exilis *Gmel.*, *Lister*, *C.* t. 8. f. 1.

Inhab. West Indies, St Vincent's. Rev. L. Guilding.

Introduced by Montagu (*T. B.* 384.) on the authority of Mr. Byers, who stated he found it at Weymouth and at Dorchester! Mr. Alder observes, that since Dr. Turton has withdrawn his statement of having found this shell in Ireland, Mr. Byers remains our only authority for considering it as British; but, whatever the original shell found by Mr. Byers may have been, the specimens now in English cabinets appear all to belong to the genus *Bulimus*, and are most likely foreign. Capt. Blomer sent me, continues Mr. Alder, a foreign *Paludina* for this shell, a few years ago. The *Bulimus radiatus* of France, and *B. exilis* of the West Indies, are the species which generally occupy its place in the British cabinets.

3. BULIMUS *fragilis* Lam. Hist. vi. ed. 2. 231.

Inhab.

Introduced by Lamarck, who received it from Dr. Leach as the *Helix fragilis* of Montagu; but this must be a mistake, as Montagu's shell is certainly, as his description and figure show, the young state of *Lymneus stagnalis*. The above-described may be only a bleached specimen of the next.

4. BULIMUS *fuscus*.

Bulimulus fuscus *Guilding*, *Zool. Journ.* iv. 176.
Helix fragilis *Montagu*, *Cabinet* (in *Brit. Mus.*) not in *T. B.*
Helix lymnoides *Férussac* (?) 57. 393.

Inhab. West Indies, St. Vincent's. Rev. L. Guilding.

Introduced into the British Fauna by Montagu, who had a specimen mixed with his *Lymneus fragilis*, according to D. Leach.

5. Bulimus *cylindrus* Gray, Ann. Phil. 14.— f. 68.
Bulimus articulatus *Turton, Man.* ed. i. 85. f. 68. not *Lam.*
Macroceramus signatus *Guilding, Zool. Journ.* iv. 168.
Turbo formosus *Wood, Cat. Supp.* t. 6. f. 26.

Inhab. West Indies, Island of Tortola. Rev. L. Guilding.

Introduced by Dr. Turton, who says he received it from Cornwall, and figures it for *B. articulatus* of Lamarck, which is only a variety of *B. fasciatus*. Deshayes refers to Turton's figure for Lamarck's species. (See *Hist.* ed. 2. 243.)

6. Conovulus *coffee*.
Voluta coffee *Linn.* s. n. 1187.
Auricula coniformis *Lam., Fér.*
Bulimus coniformis *Brug.*

In Montagu's collection in the British Museum, mixed with *Voluta bullæoides*. It does not agree with the figure or description.

7. Detracia *bullæoides* Gray.
Voluta bullæoides *Mont. T. B.* t. 30. f. 4.
Auricula bullæoides *Gray, Ann. Phil.* 15.
Auricula multivolvis *Jeffreys, Linn. Trans.* xiii. 516.
Tornatella bullæoides *Férus. Prod.* 108.

Inhab. West Indies, St. Vincent's. (Guilding.)

Introduced by Colonel Montagu, who found it as British in the Portland Museum! Mr. Jeffreys adds it to his list, at the same time expressing a doubt, as Mr. Clark had found it among W. Indian shells. It is one of the most common shells in the small boxes from the West Indies, and forms a particular genus of *Auriculæ*, characterised by having only a single plait on the front of the pillar.

8. TRALIA *pusilla* Gray.
Auricula pusilla *Desh.*, *Lam. Hist.* ed. 2. 332.
Voluta pusilla *Gmel.* 3436.
Bulimus ovulus *Brug.* 71.
Auricula ovula *Férus. P.* 104. *Portez*, *Gall.* i. 204. t. 20. f. 13, 14.
A. nitens *Lam.*
Voluta triplicata *Donovan*, *B. S.* t. 138.
Melampus ovulum *Lowe*, *Zool. Journ.* v. 289.

Inhab. West Indies.

Introduced by Donovan as found on the shores of Guernsey. This forms a genus (peculiar for having a simple internal lip, with a subposterior internal groove, where the notch occurs in *Sidula felis Catti*) between *Sidula* and *Pedipes*.

9. APLEXUS *rivalis* f. 112., Maton and Racket, L. Trans. xiii. 126. t. 4. f. 2., Turton, Man. ed. 1. 128. f. 112.
Physa marmorata *Guilding MSS.*

Inhab. West Indies, St. Vincent's. Rev. L. Guilding.

Introduced by Dr. Maton and Mr. Racket. Said to have been found by Mr. James Hay, in Hampshire.

10. **Neritina** *virginea* Lamarck, n. 18.
Nerita virginea *Linn.* s. n. 1254.
Neritina declivis *Say*, — *Chemn.* ix. t. 124. f. *h. i.*

5

Inhab. West Indies and N. America.

Introduced by Dr. Turton, who says he found several of this shell on the coast of Ireland. *Conch. Dict.* 128. They most probably came from some wreck.

11. **Truncatella** *subcylindrica.*
Helix subcylindrica *Pulteney*, *Dorset*, 49., *Gmelin* (?) *Mont. T. B.* 393.

Inhab. West Indies.

6

Dr. Pultney introduced this shell as being found on water-plants in ponds and ditches in Dorsetshire. Montagu justly doubts it, and says it is a common West Indian species. See remarks on *Truncatella truncata*, by Lowe, *Zool. Journ.* v. 280., and Deshayes, *Lam. Hist.* ed. 2. 265.

12. **Melania** *Matonii* Gray, Miscellany, 1.
Murex fuscatus *Maton and Racket*, *Linn. Trans.* vii. 150. t. 4. f. 6.

An African river shell.

Introduced by Dr. Maton and Mr. Racket, and said to have been found after a storm at Weymouth, by Mr. Byers.

Thus have I felt myself called on to exclude from our Fauna no fewer than 50 species.

In considering the *geographical distribution* of the British land and fresh-water Mollusca, we must look at them at least in two points of view; first, as regards their bearing on the general distribution of Mollusca in the rest of Europe, and, secondly, the extent to which the various species are diffused over the different parts of the island, which is influenced by the climate, the elevation, and the nature of the subsoil, or of the rock of which the country is chiefly formed.

All the species which appear to be really native, and are therefore noticed in this work, are found in France, or in different parts of Germany, except the following; —

1. *Assiminia Grayana.*
2. *Helix fusca* Montagu.
3. *Vertigo angustior.*
4. *Amphipeplea involuta.*
5. *Planorbis glaber.*
6. *Pisidium cinereum.*
7. ——— *nitidum.*
8. ——— *pulchellum.*
9. ——— *Henslowianum.*

Most of these are newly-described species, and may have been overlooked, or only considered as varieties of other well-known species, by the zoologists of the Continent. It is to be remarked that, in general, the British species, although they vary among themselves, attain a moderate, and nearly uniform, size, compared with those of the rest of Europe. Thus I have never seen *Lymneus stagnalis*, *Paludina achatina* or *crystallina*, so large as those found in the south-eastern part of Germany; or *Helix nemoralis*, and other more common *Helices*, as those found in Portugal, or the *Helix aspersa* from Algiers; nor, on the other hand, have I seen any English specimens of *Helices* so stunted in growth as the Alpine varieties of *H. nemoralis* and *H. arbustorum*, which I have received from the Swiss Alps.

Férussac has observed (*Journ. de Phys.* 1820) that it is remarkable that in our more northern latitudes, as compared with France, there are found in abundance some species, such as *Helix Pisana* and *Bulimus acutus*, which for their size and colour are only to be compared to the French specimens found on the banks of the Loire.

On the other hand, there are many species, not found in our catalogues, that are common to nearly all the rest of Europe.

Thus, according to Nilson, 73 of our British species are found in Sweden, and many of them, as for example,—

Helix pygmea.
——— *fulva.*
——— *rotundata.*
——— *pulchella.*
Zua lubrica,

at its most northern extremity; and he has, in his Fauna, 16 species which have not yet been found in Britain or Ireland, viz:—

Limax tenellus.
Helix bidentata Nilson, not Gmelin.
* — *fruticum.*
* — *strigella.*
* — *incarnata.*
* — *conspurcata.*
* — *ericetorum* Nilson, not Linn. *H. candidula* Studer.
Clausilia papillaris, if it is not our *C. biplicata.*
* *Pupa costulata.*
Paludina Balthica, if not our *Littorina ulvæ.*
——— *octona.*
* ——— *similis.*

Cyclas lacustris.
Unio ater.
* — *crassus* Nilson. *U. littoralis* Lam.
—— *limosus.*

And of these at least half (those marked with a star) are also common to France and to Germany; and this may be the case with some of the others. Some of these species (of *Helix* for example) are of a size as large as *H. hortensis* and *H. rufescens;* and the largest, as *H. fruticum*, *H. strigella*, and *H. candidula*, are found as far south as Vienna, and *H. incarnata* as far as Italy. Indeed, some of the continental conchologists appear to upbraid our idleness in not having found them in England, where, probably overlooking our insular position, they assume that these species ought to be found.

Nearly three fourths of our species, that is to say, 91 out of the 126, are recorded by Pfeiffer as inhabiting Germany; and the Germans have 80 species which are wanting to our Fauna; but it is remarkable that they have not some of our larger species, as—

Limax carinatus,
Helix limbata,
—— *fusca,*
—— *Pisana,*
—— *granulata,*
Amphipeplea glutinosa,
Segmentina lineata.

They also want some of our smaller ones, as—

Zonites purus,
——— *radiatulus,*
——— *excavatus,*
Pupa umbilicata (?)

Pupa anglica,
Vertigo alpestris,
——— *angustior,*
——— *palustris,*
Planorbis lævis,
and 2 or 3 *Pisidiums.*

On the other hand, many of the British shells find their southern limits in France and Germany, for only 22 of them are found in Sicily, and only 17 in Corsica. Of these southern species, the greater part, viz., the 18 following, are common to those countries, Britain, and Sweden, viz., —

Paludina achatina,
——— *crystallina,*
Bithinia impura,
Succinea putris,
Helix nemoralis,
——— *pulchella,*
——— *ericetorum,*
Zonites radiatus,
——— *cellarius,*
Achatina acicula,
Clausilia Rolphii (?)
——— *rugosa,*
Limnæus pereger,
——— *stagnalis,*
——— *palustris,*
——— *fossarius,*
——— *glaber,*
Anodon cygneus.

There are only a very few species of the British land and fresh-water Mollusca which appear to be common to the American continent.

According to Férussac,
Helix pulchella is the *H. minuta* of Say.
Zonites nitidus is probably the *H. arborea* of Say.
Say considered the
Paludina vivipara of the two countries the same species.
Mr. Lea considers, I believe truly, that the
Unio margaritifera of the two countries is the same species.

From the facility with which the land Mollusca can be transported during their torpidity, there have been introduced into Canada and the United States the following British species: —

Helix nemoralis. Canada and U. States.
—— *hortensis.* Boston.
—— *aspersa.* U. States.
—— *virgata.* U. States. *Férus.*
—— *Pisana.* U. States. *Férus.*
Bulimus acutus. U. States. *Lesueur.*

Bulimus decollatus has been introduced into gardens near Charlestown, S. Carolina. One of the species, *H. aspersa*, has also been introduced and naturalised in Brazil and some places in S. America.

The facility with which these animals migrate and adopt a new country, as proved by the above instances, by those cited at p. 4., and by the naturalisation of the *H. cantiana* on the banks of the Tyne, will always make the study of the geographical distribution of the terrestrial Mollusca difficult. According to the accounts of the American authors, the species which have naturalised themselves retain their fondness for trees and hedges and herbage, and keep themselves quite distinct from the forest-living species of America.

The following table has been drawn out for the purpose of giving some idea (as good a one as the very imperfect materials at present at our disposal will allow) of the general distribution of the British species over the islands; and the species which have been recorded as inhabiting Germany and Sweden (the most northern country of which we have a Fauna), and those of the islands in Mediterranean, have been added in similar columns, for the purpose of comparison.

The first column indicates the species (marked No. 1.) which have been found in the neighbourhood, or within a walk, of London: in this I have depended on my own experience, and have also referred to Mr. Daniel Cooper's list.

The second indicates the species (similarly marked) found in the south, or south-eastern, part of England, including Kent and Dorsetshire, and the intermediate counties: of these Montagu has given many indications.

No. 2. Those found in Guernsey, by Mr. Forbes.

The third, the species found in the south-west and western part of our island: those marked

No. 1. are found in Cornwall, Devonshire, and S. Wales. They are chiefly extracted from Montagu and Jeffreys.

No. 2. From Bristol and Wiltshire: these are marked from Miller and Montagu.

The fourth column, the species found in the eastern part of England, as Essex, Suffolk, and Norfolk: these are marked from the lists of Sheppard, Paget, and Bloxam.

The fifth, those found in the north of England.

No. 1. Newcastle, by Mr. Alder.

No. 2. Berwickshire, by Dr. Johnston.

No. 3. Preston, Lancashire, by Messrs. Gilbertson and Kenyon.

No. 4. Scarborough, Yorkshire, by Mr. Bean.

No. 5. Derbyshire, by Mr. Bloxam.

No. 6. Nottinghamshire.

This is the most complete list next to that of the London district. The species are only marked with the other numbers when they do not occur in Mr. Alder's list.

The sixth column, those found in Scotland, extracted from the notes of Laskey and Dr. Fleming: this is very imperfect.

No. 2. Iona, by Mr. Lowe.

No. 3. Highlands, by Mr. Alder.

No. 4. Glasgow, by Mr. Alder.

The seventh, the species found in Ireland.

No. 1. Dublin, from Capt. Brown's list.

No. 2. Belfast, from specimens sent by Mr. Thompson and Mr. Hyndeman, to the British Museum collection: this is also very imperfect.

The eighth column contains the species enumerated in Mr. Forbes's *Mollusca Monensia*, as inhabiting the Isle of Man.

The 9th column is left for the collector to fill up with the shells of his own district or of any other which he may visit.

The tenth, the species described by Pfeiffer, as inhabiting Germany.

The eleventh column are the Swedish species noticed by Nilson.

The twelfth column, the species mentioned by Philippi as found in Sicily, marked 1, and by Payradeau in the island of Corsica, marked 2.

Numbers and Name.	1	2	3	4	5	6	7	8	9	10	11	12
1. Neritina fluviatilis, f. 124.	1	1	2	1	-	-	1	-		1	1	
2. Assiminia Grayana, f. 127.	1	1		1								
3. Paludina vivipara, f. 118.	1	-	-	1	-	-	1	-		1	1	1
4. achatina, f. 119.	1	-	-	1	-	-	-	-		1	-	1
5. Bithinia tentaculata, f. 120.	1	1	2	1	1	-	1	-		1	1	1
6. ventricosa, f. 128.	1	1	-	1	3							
7. Valvata piscinalis, f. 114.	1	1	2	1	1	-	1	1		1	1	1
8. cristata, f. 115, 116.	1	1	2	1	1	-	1	-		1	1	
9. Arion ater	1	1	-	-	1	-	-	1		1	1	
10. hortensis	1	1	-	-	1	-	-	-		1	1	
11. Limax maximus, f. 14.	1	1	-	-	1	-	-	1		1	1	
12. flavus	1		1									
13. carinatus, f. 15.	1	1										
14. agrestis, f. 17.	1	1	-	-	1	-	-	1		1	1	
15. brunneus	-	-	-	-	1							
16. Vitrina pellucida, f. 21.	1	1	1	1	1	1	1	1		1	1	
17. Testacella haliotoidea, f. 19, 20.	1	1	1									
18. Helix aperta, f. 129.	-	2										
19. aspersa, f. 35.	1	1	-	1	1	1	-	1		1	-	2
20. hortensis, f. 23.	1	1	2	1	1	-	1	1		1	1	
21. hybrida, f. 130.	1	1	-	-	1	-	-	-		2		
22. nemoralis, f. 24.	1	1	2	1	1	1	1	-		1	1	2
23. Pomatia, f. 34.	1	1	2	-	-	-	1	1		1	1	
24. arbustorum, f. 25.	1	1	2	1	1	-	1	-		1	1	
25. obvoluta, f. 131.	-	1	-	-	-	-	-	1		1		
26. lapicida, f. 51.	1	1	2	1	-	-	2	-		1	1	
27. pulchella, f. 49.	1	1	2	1	1	-	1	-		1	1	2
28. limbata, f. 132.	1							1				
29. Cantiana, f. 26.	1	1	2	1	1	-	1			1		
30. Carthusiana, f. 27.	1?	1	-	-	-	-	-	-		1	-	1
31. fusca, f. 36.	1	1	2	-	1	1						
32. revelata, f. 133.	1	2										
33. fulva, f. 47.	1	1	1	1	1	-	2	1		1		
34. aculeata, f. 33.	-	1	1	1	1	-	-	-		1	1	
35. lamellata, f. 48.	1	-	-	-	1	3	2					
36. granulata, f. 29.	1	1	1	-	1	-	1	1				
37. sericea, f. 134.	1	-	-	-	1	-	-	-		1		
38. hispida, f. 41.	1	1	2	1	1	-	1	1		1	1	
39. rufescens, f. 28.	1	1	2	1	1	-	1					
40. concinna, f. 135.	1	1	-	-	1	-	-	-		1		
41. virgata, f. 31.	1	1	2	1	1	2	1	-		1	-	2
42. caperata, f. 32.	-	1	2	1	1	1	1	1		1	-	2
43. Pisana, f. 30.	1	-	12	-	-	-	1	-		-	-	2
44. ericetorum, f. 37.	1	1	2	1	1	-	1	1		1	-	2
45. Zonites radiatus, f. 44.	1	1	2	1	1	1	1	1		1	1	1
46. umbilicatus, f. 45.	1	-	2	-	1	-	1	1		1	-	1

Numbers and Name.	1	2	3	4	5	6	7	8	9	10	11	12
47. Zonites pygmæus, f. 46. - -	1	-	-	1	1	-	2	-		1	1	
48. nitens, f. 40. - -	1	-	2	1	5	-	-	1		1	1	2
49. alliarius, f. 39. - -	1	-	2	-	1							
50. purus, f. 43. - -	-	-	-	-	1							
51. nitidulus, f. 136. - -	1	-	-	1	1	-	-	1		1		
52. radiatulus, f. 137. - -	1	-	-	-	1	-	2					
53. lucidus, f. 38. - -	1	-	1	-	1	-	-	-		1		
54. excavatus, f. 138. - -	-	-	-	-	1	3						
55. crystallinus, f. 42. - -	1	-	2	1	1	-	-	1		1	1	
56. Succinea putris, f. 73. - -	1	1	2	1	1	-	1	1		1	1	
57. Pfeifferi, f. 74. - -	1	1	-	2	1	-	-	-		2		
58. oblonga, f. 139. - -	-	-	1	-	3	4	-	-		1		
59. Bulimus Lackamensis, f. 62. -	-	1	2	1	-	-	1	-		1		
60. obscurus, f. 63. - -	1	1	2	1	1	1	1	-		1	1	
61. acutus, f. 67. 69. -	-	-	1	-	-	1	-	1		1	-	1
62. Zua lubrica, f. 65. - -	1	1	2	1	1	1	1	1		1	1	
63. Azeca tridens, f. 52. - -	1	-	1	1	1	1	-	-		1		
64. Achatina acicula, f. 71. - -	1	1	2	1	1	1	-	-		1	1	1
65. Pupa umbilicata, f. 78.	1	1	2	1	1	1	1	1				
66. Anglica, f. 82. - -	-	-	-	-	1	-	2					
67. marginata, f. 79. - -	1	1	-	1	1	-	-	1		1	1	1
68. juniperi, f. 81. - -	1	1	2	-	-	1?	-	-		1		
69. Vertigo edentula, f. 80. -	1	-	1	1	1	-	2	-		1		
70. cylindrica, f. 140. - -	1	-	2	-	-	1	-	-		1		
71. pygmæa, f. 83. - -	1	-	2	-	1	-	2	1		1	1	
72. alpestris, f. 141.	-	-	-	-	1							
73. substriata, f 84. - -	1	-	2	1	1	-	-	-		1		
74. palustris, f. 85. - -	1	-	2	-	-	-	-	-		-	1	
75. pusilla, f. 86. - -	1	1	1	-	1	-	-	-		1	1	
76. angustior, f. 142. - -	1	-	2									
77. Balea perversa, f. 70. - -	1	1	1	1	1	1	-	1		1	1	
78. Clausilia bidens, f. 53. - -	1	1	2	1	1	-	-	-		1	1	
79. biplicata, f. 55. - -	1	1	2	-	-	-	-	-		1	1?	?
80. Rolphii, f. 54. - -	1	1	-	-	-	-	-	-		1?	1?	2
81. dubia, f. 143. - -	-	-	-	-	1	-	-	-		1	1?	
82. nigricans, f. 58, 59. -	1	1	2	1	1	-	1	1		1	1	2
83. Carychium minimum, f. 77. -	1	1	2	1	1	-	-	1		1	1	
84. Acme fusca, f. 66. - -	1	1	1	-	1	-	1	-		1		
85. Conovulvus denticulatus, f.144.	-	1	2	-	-	1	1	-		-	-	2
86. bidentatus, f. 145. - -	-	1	1	-	-	1						
87. albus, f. 146. - -	-	1	-	-	-	1	1	1				
88. Limnæus auricularis, f. 100. -	1	1	2	1	1	-	1	-		1	1	
89. pereger, f. 101. - -	1	1	2	1	1	1	1	1		1	1	2
90. stagnalis, f. 102. 104, 105.	1	1	-	1	1	-	1	-		1	1	2
91. palustris, f. 107. - -	1	1	2	1	1	-	1	1		1	1	2
92. truncatulus, f. 108. -	1	1	2	1	1	-	1	1		1	1	2

Numbers and Name.	1	2	3	4	5	6	7	8	9	10	11	12
93. Limnæus glaber, f. 106. -	1	1	1	2	1	-	1	-		1	1	
94. Amphipeplea glutinosa, f. 103.	1	1	-	-	-	1	1	-		-	1	
95. involuta, f. 147. -	-	-	-	-	-	-	3					
96. Ancylus fluviatilis, f. 125. -	1	-	2	-	1	1	1	-		1	1	
97. Velletia lacustris, f. 126. - -	1	-	2	1	1	-	1	-		1	1	
98. Physa fontinalis, f. 110. -	1	-	2	1	1	-	1	1		1	1	
99. Aplexus hypnorum, f. 113. -	1	-	2	1	1	-	1	-		1	1	
100. Planorbis corneus, f. 95. -	1	-	-	1	-	?	1	-		1	1	
101. albus, f. 92. - -	1	-	2	1	1	1	1	1		1	1	
102. lævis, f. 148. - -	-	-	-	-	1							
103. imbricatus, f. 94. - -	1	1	2	1	1	-	1	1		1	1	
104. carinatus, f. 92. - -	1	-	2	1	-	-	1	-		1	1	
105. marginatus, f. 87, 88. 90.	1	-	-	1	1	-	1	-		1	1	
106. vortex, f. 91. - -	1	-	2	1	5	-	1	-		1	1	
107. spirorbis, f. 98. - -	1	-	2	1	1	-	1	1		1	1	
108. nitidus, f. 93. - -	1	1	2	1	1	-	1	-		1	1	
109. contortus, f. 96. - -	1	-	2	1	1	1	1	1		1	1	
110. Segmentina lineata, f. 99. -	1	1										
111. Cyclostoma elegans, f. 75. -	1	1	2	1	1	1	1	-		1		2
112. Cyclas rivicola, f. 1. - -	1	1	-	1	6	-	-	-		1		
113. cornea, f. 2. - -	1	1	2	1	1	-	1	-		1	1	
114. calyculata, f. 3. - -	1	-	2	1	1	-	-	-		1	1	
115. Pisidium obtusale, f. 149. -	1	1	-	-	-	-	-	-		1	1	
116. nitidum, f. 150. - -	1	1	-	3								
117. pusillum, f. 7. - -	1	-	2	2	1	-	-	-		1?	1	
118. pulchellum, f. 151. -	1	1	-	3	1							
119. Henslowianum, f. 6. -	1	1	-	1	-	-	-	-		-	1	
120. amnicum, f. 5.	1	-	2	1	1	-	1	-		1	1	
121. cinereum, f. 152. - -	-	-	-	-	1							
122. Anodon cygneus, f. 8. - -	1	1	2	1	1	1	1	-		1	1	
123. Alasmodon elongatus, f. 9. -	-	-	1	-	-	1	1	-		1	1	
124. Unio pictorum, f. 11. - -	1	-	2	2	-	-	-	-		1	1	
125. tumidus, f. 13. - -	1	-	-	-	1	-	-	-		1	1	
126. ovalis - - -	1											
127. Batavus, f. 10. - -	1	-	-	-	-	-	-	-		1	1	
128. Dreissena polymorpha - -	1	-	-	-	7	5	-	-		1		

There are common to the north and south of England 78 species.
——— to the west and north - - 3
peculiar to the south of England - - 33
——— to the west, 41. 57. 60. 67 - - 4
——— to the north of England - - 9
——— to Ireland, 95 - - - 1
——
128

The mere inspection of this table will show that most of the species have a very extensive range, having been found in all parts of our island where there has been a zoologist who has taken any interest in searching for them. Thus we find, that out of the 128 species recorded in this work, 107 species are found within a circle of about 15 miles of the metropolis, and 89 in the northern district of England.

Of the species which are confined to the southern half of the kingdom there may be noticed among the aquatic kinds —

Assiminia Grayana, only found in the Thames and the streams running into it, from its mouth to where the water is only slightly brackish, or nearly fresh, at the very highest tides, as at Greenwich, for example.

Paludina vivipara and *P. achatina* are not found in the northern part of the island. *P. crystallina* is found in the rivers of Cambridgeshire, Oxfordshire, Essex, and Suffolk; and *P. achatina* is very common in the Thames, and also in the rivers of some of the before-mentioned counties: they are found together in the river Colne, at Uxbridge. These species avoid the slightest degree of brackishness in the water, and are therefore only found in the upper part of the rivers.

Bithinia ventricosa is very commonly found with this latter in the Thames, and in Suffolk; but it keeps in the smaller streamlets, and is not so particular about the absence of brackishness, for it is found with *B. impura* and *Assiminia* in the streams of the Greenwich marshes.

Neritina fluviatilis, and *Planorbis corneus*, are also confined, as far as I have had the opportunity of learning, to the southern part of the island. Montagu says that Dorsetshire is the western limit of the *Neritina;* this is curious, as it and the two species of *Paludina* are found in Ireland.

Segmentina lineata has only been mentioned as found near London and in the south-west of England. Near London it is not uncommon.

Limnæus acutus (if it is more than a variety of *L. pereger*) has only been recorded as found in South Wales.

Cyclas rivicola is almost peculiar to the Thames: its northern limit is, I believe, the Trent in Nottinghamshire: it is also found in Germany.

Pisidium obtusale, *P. nitidum*, and *P. Henslowianum*, have only been recorded as found near London, in Surrey, and in Cambridgeshire; but this, perhaps, is because they have not been searched for elsewhere.

The *Uniones* (*U. pictorum*, *U. tumidus*, and *U. Batavus*) are not recorded as being found in the north of England, or in Scotland, as far as I know.

Among the southern terrestrial species, *Testacella haliotoidea* seems confined to the gardens in the neighbourhood of London, Plymouth, Biddeford, and to the island of Guernsey.

Helix obvoluta, to the chalk downs of Hampshire. This species is common to the north of France and Germany.

Helix limbata has only been found in the hedges near Hampstead, Middlesex; but it is very doubtful if these specimens had not been introduced: it is common in the southern part of France, and has been found as far north as Caen.

Helix Pomatia is nearly confined to the chalk district of the south of England: it has been found as far north as Wiltshire. Miller says it is rare in a park at Bristol (where it might have been introduced). According to Montagu, "it is not an aboriginal species in this kingdom, but was first introduced about the middle of the 16th century, either as an article of food, or for medicinal purposes. It is supposed they were first imported from Italy, and turned out in Surrey by a Mr. Howard at Albury. It is also said that Sir Kenelm Digby [about 1630?] dispersed them about Gothurst, near Newport Pagnel, in Buckinghamshire; and Mr. Morton informs us they were turned out by Lord Statton, at Kerby in Northamptonshire." Dr. Turton observes that their having been used as food, as mentioned by Lister (to which I may add the fact of Merret having mentioned them without any note, as found in Sussex, in his *Pinax*, published in 1667), strongly militates against the idea of their being of foreign origin. They have been said to be found as far north as Devizes, in Wiltshire, and in Gloucestershire. I believe they are rather restrained by the limits of the chalk basin than by the climate, as they are abundant in the Botanic Garden, and the gardens of the nobles in the south of Sweden, where the climate is much more rigorous; and I have no doubt that, if they could pass the other strata, they could live on the chalk in Yorkshire. "Some years ago they were introduced into Scotland by Patrick Neil, Esq., and placed in his curious and most interesting garden at Cannon Mills, but we believe they have not prospered, and are gradually disappearing." (*Johnston, Mag. N. Hist.* 47.)

Helix Cantiana has been supposed to be almost confined to the four metropolitan counties, but it is also found in Suffolk, near Bristol, and near Dublin. It may have been introduced in these latter localities for it has been within these few years, according to Mr. Fryer, introduced with ballast by the colliers on the banks of the Tyne; and is now rapidly spreading itself in the hedges of that neighbourhood. These circumstances would lead one to imagine that it might also have been introduced into England from the Continent; but Férussac, who has compared it with the continental species, regards it at least as a local variety of *H. Carthusiana* of Draparnaud (not of Müller), which is a native of the south of France and Italy.

Helix Carthusiana Müller, is confined to the downs (especially those bordering the sea) of Kent and Surrey, where it is found in abundance on the short stunted grass: it is also found in the south of France, Greece, and Syria.

Helix aperta and *H. revelata* have as yet only been found in the island of Guernsey, where they were discovered by Mr. Edw. Forbes. This island is nearer the coast of France than that of England, and is geographically part of the former country. The first species is a native of Provence, and is not yet recorded as found in the northern part of France; Guernsey must be considered its northern limit, but it is a very shy species, and difficult to find, even in Provence, except after a shower of rain. The *H. revelata* is found in Normandy, and near Paris.

Bulimus acutus is found in similar situations to *H. virgata* and *H. Carthusiana*, especially in sandy places; but it is confined to the south-western counties, South Wales, and the Isle of Man; and its most northern limit is Iona, one of the western isles of Scotland, where it has been found with *H. virgata* by Mr. Lowe.

Helix Pisana is found with the last, but is still more local, having only been procured at St. Ives in Cornwall, Tenby in South Wales, and in Ireland. This is most probably the northern limit of this shell, which is not found in Germany or Sweden.

Clausilia biplicata is equally a southern species; it is very common in several places near London, and Miller says its found near Bristol.

Clausilia Rolphii is confined, as far as I have heard, to its original habitat in Charlton wood, near London, and to the neighbourhood of Hastings, Sussex.

Succinea oblonga. This species has only been recorded as a native of South Wales and North Devon, but it has probably a larger range; I think it is indicated as a variety inhabiting Berwick, by Dr. Johnston, and it has lately been found at Glasgow and Preston.

Pupa juniperi has always been believed to be confined to the south-western part of the kingdom; but Mr. Laskey mentions it as occurring in Scotland. This requires verification.

Vertigo palustris, and *V. angustior*, have only been yet recorded as found near London and in the west of England; but they are probably common.

The zoologists of the north of England have described eight species which have not yet been discovered in the southern portion of the kingdom; some of which are probably peculiar to that district.

1. *Limax brunneus*, noticed by Dr. Johnston at Berwick, and Mr. Alder at Newcastle.

2. *Helix lamellata*, discovered by Mr. Bean at Scarborough, and found by Mr. Alder at Newcastle, and lately in North Germany.
3. *Zonites purus*, discovered by Mr. Alder, near Newcastle, where it is not uncommon.
4, 5. *Zonites excavatus* and *Pupa Anglica*, also from Scarborough.
6. *Vertigo alpestris*, found by Mr. Gilbertson of Preston, at Clithero, in Lancashire, and by Mr. Thomson near Newcastle.
7. *Clausilia dubia*, common in Yorkshire, at Newcastle, and in Lancashire.
8, 9. *Planorbis lævis* and *Pisidium cinereum*, both found in ditches, and often together, near North Shields.

There are one or two species whose distribution appears more to depend on the nature of the country than the climate. Thus, the *Alasmodon elongatus* is found in the mountain streams of Wales, Cumberland, Scotland, and Ireland, and the variety *A. e. Roissyi* is found in similar situations in Yorkshire and Scotland.

In Irish lakes there has been found by Mr. Harvey *Amphipeplea involuta*, which is very different from the English ones. It is to be hoped that this is only a forerunner of several other species which will hereafter be found in that very interesting and but little investigated country.

It is probable that many of the species here indicated may have a much more extended range; for had this sketch been written a very few years ago, many species, such as *Helix fusca*, *H. depilata*, *Bulimus Lackamensis*, *Azeca tridens*, *Pupa edentula*, *Acme fusca*, *Limnæus glaber*, *Amphipeplea glutinosa*, would have been inserted in the list of local species. The latter, though found in Sweden and France, is not recorded as a German species by Pfeiffer. Though very local where found, these and other species similarly circumstanced have been found, dispersedly, in very different parts of the islands.

Besides fewer species being found in the northern parts of our island than in the south, the specimens of the species are said to be much more rare. This is probably partly owing to the rigours of the climate, and partly to the country consisting of the older geological formations, which are less favourable to the support of these animals than the calcareous rock, which appears to be their favourite habitation.

M. D'Orbigny, who has paid great attention to the distribution of these animals, especially in South America, says, the terrestrial Pulmonobranchiata are much more abundant in the warmer regions of the different quarters of the globe than in the more temperate parts, while the aquatic species are more abundant in the latter than in the former.

He observes that the terrestrial species gradually diminish in number as we proceed from the warmer regions towards the pole; and as we ascend from the plains to the tops of mountains. Out of the 156 species which he found in South America, 137 were found between the 11th and 28th; 28 between the 28th and 34th; and only 13 between the 34th and 45th degrees of south latitude; and 126 species were found under 5000 feet, while only 4 were found above 5000 feet and below 11,000 feet, and 6 at more than 11,000 feet, above the level of the sea.

It may be well to observe, that the fossil shells now found in the different strata show that a different geographical distribution of these animals existed in a former state of the globe; for several genera were found in this country then which are now confined to warmer climates. Thus, there are in the most recent strata, mixed with existing recent shells, remains of species which agree with those now only found in other parts of Europe and the north of Africa.

Mr. Morris, for example (*Mag. N. Hist.*, 1836. 262. n. s. ii. 544.), has recently found the following 36 species of recent British shells, along with remains of Mammalia, at Grays, Erith, Copford, Sutton, and Ilford, on the banks of the Thames, not very far from London.

1. *Limax* ———, species not determined.
2. *Succinea amphibia.*
3. ——— *Pfeifferi* (*oblonga*).
4. *Helix hortensis.*
5. —— *rufescens.*
6. —— *paludosa.*
7. —— *hispida.*
8. —— *trochiformis.*
9. —— *fusca.*
10. *Zonites lucidus.*
11. *Zua lubrica.*
12. *Pupa marginata.*
13. —— *sexdentata.*
14. *Carychium minimum.*
15. *Limnæus auricularis.*
16. ——— *pereger.*
17. ——— *truncatulus.*
18. ——— *glaber.*

19. *Planorbis carinatus.*
20. ——— *corneus.*
21. ——— *vortex.*
22. ——— *contortus.*
23. ——— *imbricatus.*
24. ——— *nitidus.*
25. *Bithinia tentaculata.*
26. *Paludina* ——— ?
27. *Valvata cristata.*
28. ——— *piscinalis, var. V. antiqua* Morris (*Loud. Mag. N. H.*, series 2., ii. 544., f. 26.).
29. *Velletia lacustris.*
30. *Ancylus fluviatilis.*
31. *Cyclas cornea.*
32. *Pisidium obliquum.*
33. ——— *pusillum.*
34. ——— *amnicum.*
35. *Anodon cygneus.*
36. *Unio pictorum.*

All these species exactly agree with the specimens of the same species now found in the neighbourhood, except that some of the specimens of *Valvata piscinalis* are much larger and higher than those usually found in this country. Mr. Morris and Mr. G. B. Sowerby are inclined to consider them as a distinct species, and have called them *Valvata antiqua ;* but, on an accurate examination and comparison of Mr. Morris's specimen, I believe that it is only a variety, as I have seen some specimens from the warmer parts of Europe which are nearly as large, and similar to these fossil ones.

Besides these 36 species, there are found with them, —

A *Cyrena*, the same as or very nearly allied to the *Cyrena consobrina*, which is common in the Nile, near Alexandria. Mr. G. Sowerby calls it *Cyrena trigonula ;* but I do not think it is the species so named by Lamarck.

And,

Unio littoralis Lam. (*Mag. N. Hist.*, series 2., 548. f. 27.), which is common in the French rivers; and is also found in the Swedish ones.

There are also found fossil in the older strata many other species, which are all different from any of the existing ones. The land shells found in these strata are of a much larger size than those now found in Europe, and resemble more nearly the tropical species; but still, as they are not the exact representatives of exotic species, this is no proof that they were inhabitants of that kind of climate. The following species among others, have been described: —

1. *Helix globosa.* Sow. M. C. ii. t. 170.
2. *Bulimus ellipticus.* Sow. M. C. iv. t. 337.
3. ——— *castellatus.* Sow. M. C. iv. t. 366.
4. *Limnæus longiusculus.* Sow. M. C. t. 343.
5. ——— *fusiformis.* Sow. M. C. t. 169. f. 23.
6. ——— *minimus.* Sow. M. C. t. 169. f. 1.
7. ——— *maximus.* Sow. M. C. t. 328. f. 61.
8. ——— *columellaris.* Sow. M. C. t. 328. f. 2.
9. ——— *pyramidalis.*
10. *Ancylus elegans.* Sow. M. C. t. 533.
11. *Planorbis cylindricus.* Sow. M. C. t. 140. f. 2.
12. ——— *obtusus.* Sow. M. C. t. 140. f. 3.
13. ——— *lens.* Sow. M. C. t. 140. f. 4.
14. ——— *euomphalus.* Sow. M. C. t. 140. f. 7—9.
15. *Melania fasciata.* Sow. M. C. t. 241. f. 1.

16. *Melania costata.* Sow. M. C. t. 241. f. 2.
17. *Melanopsis carinata.* Sow. M. C. t. 523. f. 1
18. ——— *brevis.* Sow. M. C. t. 523. f. 2.
19. *Potamides ventricosus.* Sow. M. C. t. 341. f. 1.
20. ——— *acutus.* Sow. M. C. t. 341. f. 2.
21. ——— *duplex.* Sow. M. C. t. 340. f. 3.
22. ——— *? cinctus.* Sow. M. C. t. 340. f. 1.
23. ——— *? pliculus.* Sow. M. C. t. 340. f. 2.
24. ——— *? magnilucens.* Sow. M.C. t. 339. f. 4.
25. *Paludina lenta.* Sow. M. C. t. 31. f. 3.
26. ——— *concinna.* Sow. M. C. t. 31. f. 4. 8.
27. ——— *? Phasianella orbicularis.* Sow. M. C. t. 176.
28. *Paludina ? Ph. angulosa.* Sow. M. C. t. 175.
29. ——— *? Ph. minuta.* Sow. M. C. t. 175.
30. *Nerita globosa.* Sow. M. C. t. 424. f. 1.
31. —— *aperta.* Sow. M. C. t. 424. f. 234.
32. *Cyclas pulchra.* Sow. M. C. t. 527. f. 1.
33. *Unio Solandri.* Sow. M. C. t. 517.

All found in the fresh-water strata of the Isle of Wight, and the same strata at Hordwell, in Hampshire, with *Myæ*, *Psammobiæ*, and *Corbulæ* : —

1. *Paludina fluviorum.* Sow. M. C. t. 31. f. 1.
   Is abundant at Petworth Martle.
2. *Paludina elongata.* Sow. M. C. t. 509. f. 12.
   Perhaps a Bithinia.
3. *Paludina carinifera.* Sow. M. C. t. 509. f. 3.
   Is found in Hastings sands.

Unio Mantellii. Sow. Geol. Trs. iv. t. 21. f. 14.
—— *subtruncatus.* Sow. G. T. iv. t. 21. f. 15.
—— *Gaulterii.* Sow. G. T. iv. t. 21. f. 16.
—— *Martini.* Sow. G. T. iv. t. 21. f. 17.
Cyclas media. Sow. M. C. t. 527. f. 3.

Cyclas membranacea. Sow. M: C. t. 527.
Neritina Fittonii. Sow. G. T. iv. t. 22. f. 7.
Paludina Sussexensis. Sow. G. T. iv. t. 22. f. 6.
Melanopsis ? tricarinata. Sow. G. T iv. t. 22. f. 4.
——— *? attenuata.* Sow. G. T. iv. t. 22. f. 5.
Cyclas parva. Sow. G. T. iv. t. 22. f. 7.
—— *subquadrata.* Sow. G. T. iv. t. 21. f. 8.
—— *elongata.* Sow. G. T. iv. t. 21. f. 9.
—— *angulata.* Sow. G. T. iv. t. 21. f. 12.
—— *major.* Sow. G. T. iv. t. 21. f. 13.
In Wealden clay.
Unio porrectus. Sow. M. C. t. 594. f 1.
—— *compressus.* Sow. M. C. t. 594. f. 12.
—— *ambiguus.* Sow. M. C. t. 594. f. 3—5.
—— *aduncus.* Sow. M. C. t. 595. f. 2.
—— *cordiferus.* Sow. M. C. t. 592. f. 1.
In sandstone of Tilgate forest.

There are some other *Paludinæ*, *Uniones*, *&c.*, figured in Mr. Sowerby's *Mineral Conchology*, but they appear to be properly referrible to the marine genera, as they are found with decidedly marine shells. It should be remarked, that all the recent species of *Melania*, *Melanopsis*, and *Potamides* are confined to the warmer and nearly tropical parts of the world. A small species of *Melania* (*M. helvetica*) only has been found in the south of Europe; and there is a larger species (*Melania Virginica*) found in North America.

The situations chosen by the different species of land shells, are characteristic, and worthy of observation. Thus —

Helix Pomatia is found on the ground. It buries itself during the cold weather, as the tropical species do during the dry season.

Arion antiquorum,
Limax maximus,
——— *agrestis,*
Helix hortensis,
—— *hybrida,*
—— *nemoralis,*
—— *fusca,*
—— *Cantiana,*

live in hedges and banks, walking about in the dew, or after rains.

Helix virgata,
—— *caperata,*
—— *ericetorum,*
—— *Pisana,*
—— *Carthusiana,*
Bulimus acutus,

are found, after dry weather, sticking to the dry stunted vegetation on heaths. They go down to the root, and come out again after the summer rains; and are so abundant that they are vulgarly believed to have come down from the clouds with the rain.

The *Helix rupestris* is found between the brick or stone at the tops of walls, and in the earth in the higher parts of rock.

Pupa marginata,
Achatina acicula, &c.

are found in the moss at the roots of grass, &c.

The *Helix arbustorum,* in wet shady situations near a black boggy soil, on the margin of ditches or rivers.

Bulimus obscurus,

Pupa juniperi,
Clausilia Rolphii,
——— *bidens*,
Cyclostoma elegans,
in shady situations under nettles, dog's mercury, &c., in woods, especially on a chalky soil.

It may be interesting to give an outline of the history of the various additions which have been made from time to time to this part of our Fauna.

1. Merret, who, in 1667 published the first attempt at a British Fauna, in his *Pinax*, has recorded six species.

1. Anodon cygneus (*Mytilus*, or Horse Muscle).
2. Limneus (*L. stagnalis ?*). List. Ang. t. 2. f. 1.
3. Limax maximus.
4. Helix Pomatia, which he says is found in Sussex.
5. Helix rufescens (*Cochlea alba minor ubique in hortis*).
6. Helix nemoralis (*Cochlea vulgaris testa variegata*). List. Ang. t. 2. f. 3.

2. Dr. Lister, in 1678, commenced a separate work on the British shells, and, as was to be expected from his accuracy and the extent of his researches, he may be considered as the originator of this part of the science. He described and figured in this work, and in his larger work on conchology (where he marked the British species with an A), the following species; and has besides given a good account of their animals. He gave, in the appendix to his larger work, the dissections of many of them.

1. Neritina fluviatilis. Ang. t. 2. f. 20. Conch. t. 141. f. 38. t. 607. f. 43, 44.
2. Paludina achatina. Ang. t. 2. f. 18. Conch. t. 126. f. 26.
3. Paludina vivipara. Conch. t. 1055. f. 6., and Anat. t. 6. f. 5.
4. Bithinia impura. Ang. t. 2. f. 19. c. t. 132. f. 32.
5. Arion ater. Ang. t. 2. f. 17. Conch. t. 101. f. 102, 103.
6. Limax flavus. Conch. t. 101. b. f. 1.
7. ——agrestis. Ang. t. 2. f. 16. Conch. t. 101. f. 101.
8. Helix hortensis. Conch. t. 57. f. 54.
9. —— arbustorum. Ang. t. 2. f. 4. Conch. 56. f. 53.
10. Helix lapicida. Ang. t. 2. f. 14. Conch. t. 69. f. 68.
11. —— aspersa. Ang. t. 2. f. 2.
12. —— Cantiana. Ang. n. 12. var. p. 126.
13. —— fulva. Ang. p. 123. n. 9.
14. Helix virgata. Conch. t. 59. f. 56.
15. —— ericetorun. Ang. t. 2. f. 13. Conch. t. 78. f. 78.
16. Zonites radiatus. Conch. t. 1058. f. 11.
17. Succinea putris. Ang. t. 2. f. 24. Conch. t. 123. f. 24.
18. Zua lubrica. Ang. t. 2. f. 7.
19. Bulimus acutus. Conch. t. 19. f. 14.
20. Pupa umbilicata. Ang. t. 2. f. 6.
21. Balea perversa. Ang. t. 2. f. 11.
22. Clausilia nigricans. Ang. t. 2. f. 12.
23. ——— bidens. Conch. t. 41. f. 39.

24. Limnæus palustris. Conch. t. 124. f. 24.
25. ——— auricularis. Ang. t. 2. f. 23.
26. ——— pereger. Ang. t. 2. f. 22.
27. Ancylus fluviatilis. Ang. t. 2. f. 32. Conch. t. 141. f. 39.
28. Physa fontinalis. Ang. t. 2. f. 25. Conch. t. 134.
29. Planorbis marginatus. Ang. t. 2. f. 27.
30. ——— vortex. Ang. t. 2. f. 28.
31. ——— corneus. Ang. t. 2. f. 26.
32. Aplexus hypnorum. List Conch. App. f. 5. Pet. Gaz. t. 10. f. 8.
33. Cyclostoma elegans. Ang. t. 2. f. 5.
34. Unio pictorum. Ang. t. 2. f. 30.
35. —— tumidus. Ang. app. f. 6.
36. Alasmodon elongatus. Ang. app. t. 1. f. 1.
37. Cyclas rivicola. Ang. app. 22. Conch. t. 159. f. 14.
38. —— cornea. Ang. t. 2. f. 31.

3. Petiver, in his *Gazophylacium*, figured the following species, which had not been noticed by Lister:—

1. Valvata obtusa. Gaz. t. 18. f. 2.
2. Helix hispida. Gaz. t. 93. f. 13.
3. Zonites nitens. Gaz. t. 93. f. 14.
4. Planorbis contortus. Gaz. t. 92. f. 8.
5. ——— albus. Gaz. t. 92. f. 8.

4. In 1777, Pennant, in his British Zoology, added—

1. Vitrina pellucida, noticed again by Capt. Brown in 1818.
2. Helix Pisana, as H. zonaria.
3. Limnæus glaber.

5. Boys, in 1784, in *Walker's Minute Shells*, added the following small species, which had before been overlooked:—

1. Valvata cristata, f. 18, 19.
2. Helix pulchella, f. 23.
3. Bulimus obscurus, f. 41.
4. Achatina acicula, f. 59, 60.
5. Carychium minimum, f. 51.
6. Acme fusca, f. 42.
7. Conovulus denticulatus, f. 50.
8. Planorbis imbricatus, f. 20, 21.
9. Segmentina lineata, f. 28.

6. In 1786, Mr Lightfoot the botanist, in the Philosophical Transactions, added —

1. Helix pulchella, var. crenella, t. 3. f. 1. 4.
2. ——- aculeata, t. 2. f. 1. 5.
3. Planorbis nitidus, t. 2. f. 1. 4.
4. Velletia lacustris, t. 3. f. 1.

7. Dr. Pulteney, in his catalogue of the Dorsetshire shells, adds —

1. Helix caperata.
2. ——— umbilicata.
3. Azeca tridens.
4. Planorbis spirorbis.

He added, however, to the list, at the same time, several exotic species.

8. Dr. Maton and the Rev. Mr. Racket, in 1797, in the *Linnean Transactions*, added —

1. Pisidium amnicum.

9. Montagu, in 1803, in his excellent work on the British Testacea, added —

1. Helix fusca.
2. —— granulata.
3. Bulimus Lackamensis.
4. Pupa juniperi.
5. Vertigo substriata.
6. ——— angustior, as T. vertigo.
7. Clausilia biplicata.
8. Planorbis carinatus.
9. Limnæus truncatulus.
10. Conovulus bidentatus.
11. ———— albus.
12. Amphipeplea glutinosa.
13. Cyclas calyculata.
14. Unio ovatus.
15. —— Batavus.

10. In June, 1819, Dr. Turton, in his *Conchological Dictionary*, added —

1. Pupa marginata.

11. Baron Férussac, in 1820, in his *Concordance of the British Land and Fresh-water Mollusca*, first published as British, from specimens sent by Dr. Leach and Dr. Goodall, together with Testacella Maugei —

1. Helix Carthusiana.
2. Clausilia Rolphii.

12. In 1821, at the end of an outline of an arrangement of Mollusca, published in the *Medical Repository*, I added the following, among some others which had been neglected by British authors.

1. Assiminia Grayana.
2. Bithinia ventricosa.
3. Arion hortensis.
4. Zonites crystallinus.
5. ——— nitidulus.
6. ——— radiatulus.
7. ——— lucidus.
8. ——— pygmæus.

13. In 1822, Dr. Turton, in his work on bivalves added —

1. Pisidium pusillum.

14. In the same year, Mr. Miller, in his *List of Shells about Bristol,* with three noticed in the former list, added —

1. Zonites alliarius.

15. In the same year, M. Férussac, in his *Prodromus,* added, —

1. Pupa anglica, sent him by Mr. Bean.

16. In 1825, the Rev. Mr. Sheppard, in his *List of Suffolk Shells,* added —

1. Vertigo edentula.
2. Planorbis carinatus, var. deformis.
3. Pisidium Henslowianum.

17. In 1826, Dr. Turton, in his Conchological Notices, in the *Zoological Journal,* added —

1. Cyclostoma simile *Drap.*, if not Bithinia ventricosa.
2. Cyclostoma acutum *Drap.*
3. Limnæus scaturiginum = Lim. stagnalis Junior.

All shells which it is impossible to determine; and with them he introduced the foreign *Bulimus decollatus.*

18. In 1829, Mr. Jeffreys, in his paper in the *Linnean Transactions*, added —

1. Succinea oblonga.
2. Helix concinna.
3. —— lamellata, from Mr. Bean.
4. Vertigo cylindrica.
5. ——— pygmæa, from my specimen in B. M.
6. ——— palustris, from my specimen in B. M.
7. ——— pusilla.

19. In 1830, Mr. Alder, in his *List of Newcastle Shells*, added —

1. Succinea Pfeifferi, distinguished as a variety by Jeffreys.
2. Zonites purus.
3. ——— excavatus.

20. In 1831, Capt. Brown, in the *Edinburgh Journal of Geographical Science*, added —

1. Pisidium obtusale.
2. ——— pulchellum.

21. In 1831, Dr. Turton, in his *Manual*, added —

5. Limax carinatus, from Dr. Leach's work.

22. In 1831, Mr. Lindsay, in the *Linn. Trans.*, added

1. Helix obvoluta.

23. In 1832, Mr. Jenyns, in his *Monograph on Cyclas and Pisidium*, added —

1. Pisidium nitidum.

24. In 1834, Mr. Thompson, in a notice read at the Linnean Society, added —

1. Amphipeplea involuta.

25. In 1837, Mr. Alder, in his list of British land and fresh-water shells, added —

4. Helix hybrida, as a variety of H. hortensis.
5. ——— depilata.
6. ——— limbata, on the authority of Mr. G. B. Sowerby.

26. In 1838, Mr. Alder, in a supplement to his paper on the Newcastle shells, added —

7. Helix sericea.
8. Vertigo alpestris.
9. Clausilia dubia.
10. Planorbis lævis.
11. Pisidium cinereum.

27. In 1838, Mr. Gilbertson, at the meeting of the British Association at Newcastle, added —

1. Alasmodon elongatus, var. Roissyi.

28. In 1839, Mr. Edward Forbes and Mr. Goodsir gave me, for the Museum collection, from Guernsey.

1. Helix aperta.
2. ——— revelata.

The following works and papers treat on British land and fresh-water Mollusca, and have been consulted in the revision of this edition.

Joshua ALDER.

Notes on the Land and Fresh-water Mollusca of Great Britain, with a revised List of Species. Mag. Zool. and Botany, ii. 101. (Aug. 1837.)

Catalogue of the Land and Fresh-water Testaceous Mollusca found in the vicinity of Newcastle-upon-Tyne, with remarks. Newcastle, 1830. 4to. In the Transactions of the Nat. Hist. Soc. of Northumberland.

Supplement to a Catalogue, &c. Newcastle, 1837. 4to.

William BEAN.

Fusus Turtoni *Bean*, and Limnea lineata *Bean;* two rare and hitherto undescribed shells, described and illustrated. Loudon's Mag. N. Hist. viii. 1834.

Rev. M. G. BERKELEY.

Notice on the Rev. L. Guilding's Description of *Ancylus.* Zool. Journ. v. 269.

Description of the Animals of Voluta denticulata *Mont.*, and Assiminia Grayana *Leach.* Zool. Journ. v. 427.

A Description of the Anatomical Structure of Cyclostoma elegans. Zool. Journ. iv. 278.

J. BERKENHONT.

Synopsis of the Natural History of Great Britain and Ireland. 2 vols. 1789.

Andrew BLOXAM.

An Enumeration of the Land and Fresh-water Shell Snails of Norfolk and Derbyshire. Loudon's Mag. N. Hist. vi. 324.

The names of the species must be taken with caution, as the author says he found *Valvata planorbis* in Norfolk, and *Helix brevipes* in Derbyshire. Probably, misled by Turton's figure, he mistook some of the smaller *Zonites* for the latter.

Thomas **BLAIR.**

A Short Notice of the Habits of Testacellus scutulum. Loudon's Mag. N. Hist. vi. 43.

William **BORLASE.**

The Natural History of Cornwall. Oxford, 1758. fol.

Thomas **BROWN.**

Account of the Irish Testacea. Mem. Wernerian Soc. ii. 1818, p. 501.

Illustrations of British Conchology. 4to.

J. **CHILDREY.**

Britannia Baconica, or Natural Rarities of England, Scotland, and Wales. London, 1660. 8vo.

Daniel **COOPER.**

A List of the Land and Fresh-water Shells found in the Environs of London; extracted from the Flora Metropolitana. London, 1836. 12mo.

On Succinea amphibia and its Varieties. Mag. Nat. Hist., n. s., ii. 476.

List of Species found at Mickleham, Surrey. Mag. Zool. and Bot. ii. 471.

Ch. **CORDINER.**

Remarkable Ruins, and Romantic Prospects of North Britain. London, 1788-95. 4to.

Emanuel Mendes **DA COSTA.**

Historia Naturalis Testaceorum Britanniæ; or, the British Conchology, in English and French. Lond. 1778. 4to.

J. **DALE.**

A Natural History of the Sea Coast and Country about Harwich. London, 1732. 4to.

Edward DONOVAN.

Natural History of British Shells. London, 1779. 1802. 8vo.

Baron de FERUSSAC.

Concordance Systematique pour les Mollusques Terrestres et Fluviatiles de la Grande Bretagne, avec un Aperçu des Travaux Modernes des Savans Anglais sur les Mollusques. Journal de Physique, 1820, p. 213.

Edward FORBES.

Land and Fresh-water Shells of the Isle of Man. Loudon's Mag. N. Hist. viii. 69.

Malacologia Monensis. A Catalogue of the Mollusca inhabiting the Isle of Man, and the neighbouring Sea. Edinb. 1838. 8vo.

John FLEMING.

A History of British Animals. Edinb. 1828. 8vo.

Philosophy of Zoology. Edinb. 1822. 8vo. 2 vols.

Conchology. Edinb. Ency. vii. 55.

John Edward GRAY.

On Balea, in Zool. Journ. 1824, p. 61.

Conchological Observations, being an attempt to fix the Study of Conchology on a firm basis. Zool. Journ. 1824, p. 204.

On the Anatomical Difference between Helix hortensis and H. nemoralis. In Annals of Philosophy, x. (1825), p. 153.

On the Natural Arrangement of the Pulmobranchous Mollusca. Annals of Philosophy, viii. (1824), p. 107., divided into Limacidæ, Helicidæ, Auriculadæ, Lymneadæ, Onchidiadæ.

Some Observations on the Economy of Molluscous

Animals, and on the Structure of their Shells, in Philos. Transactions, 1833.

A List and Description of some Species of Shells not taken notice of by Lamarck. Annals of Philosophy, 1825.

On some new Species of Ampullariadæ. Annals of Philosophy, 1824.

On the Structure of Pearls, and the Chinese mode of producing them of a large size and regular form. Annals of Philosophy, 1824.

New British Species of Mollusca. Medical Repository xv. (1821), p. 239.

Remarks on the difficulty of distinguishing certain Genera of Testaceous Mollusca by their shells alone, and on the Anomalies in regard to Habitation of certain Species. London, 1835. 4to. In Philos. Trans. 1835.

Charles HOY.

Account of a Spinning Limax or Slug. Linn. Trans. i. 183.

S. HUTCHINS.

The History and Antiquities of the County of Dorset. London, 1774. fol.

J. G. JEFFREYS.

A Synopsis of the Testaceous Pneumonobranchous Mollusca of Great Britain. London. 4to. 1820. Linn. Trans. xiii.

Supplement to a Synopsis, &c., in Transactions Linn. Soc. xvi.

Rev. Leonard JENYNS.

A Monograph of the British Species of Cyclas and Pisidium. Cambridge, 1832. 4to. In Transac. Cambridge Phil. Soc.

George JOHNSTON, M.D.
A List of the Pulmoniferous Mollusca of Berwickshire and North Durham. Trans. Berwickshire Nat. Hist. Soc. 1838, p. 154.

Joseph KENYON.
Land and Fresh-water Shells in the neighbourhood of Preston (Lancashire). Loudon's Mag. Nat. Hist. ii. 273. 303.
Remarks on British Land and Fresh-water Shells. Loudon's Mag. Nat. Hist. i. 425.

J. LASKEY.
Account of North British Testacea. Mem. Wern. Soc. i. (1811) 370.

John LATHAM, M. D.
Observations on the Spinning Limax. Linn. Trans. iv. 84.

W. E. LEACH, M.D.
Synopsis of British Mollusca, &c. London, 1820. 8vo.; not yet published.
Only two or three copies of this work are known to be in existence; one in possession of Mr. Curtis, and the other of Mr. Bell. I have not seen it, but quoted it after Dr. Turton.

C. H. LEIGH.
Natural History of Lancashire, Cheshire, and the Peak in Derbyshire. Oxford, 1700. fol.

J. LIGHTFOOT.
An Account of some British Shells either not duly observed, or totally unnoticed by authors. Phil. Trans. (1786) lxxvi. 160.

Martinus LISTER.
Historiæ Animalium Angliæ, &c. Lond. 1678. 4to.

Appendix ad Historiæ Animalium Angliæ, &c. Eboraci, 1681. 4to.

Observations concerning the Odd Turn of some Shells' Snails. Phil. Trans. iv. n. 50. 10, 11.

Rev. R. T. LOWE.

On the Genera Melampus, Pedipes, and Truncatella, with experiments tending to demonstrate the nature of the respiratory organs of these Mollusca. In Zool. Journ. v. 280.

W. G. MATON, M. D. and *Rev. J.* RACKET.

A Descriptive Catalogue of the British Testacea, in Linn. Trans. viii. (1807).

This paper contains some good figures of the land and fresh-water shells.

W. G. MATON, M. D.

On a species of Tellina not described by Linnæus (*T. rivalis*). Linn. Trans. iii. (1797) 41.

Christopher MERRETT.

Pinax Rerum Naturalium Britannicarum, &c. Lond. 1667. 8vo.

J. S. MILLER.

A List of the Fresh-water and Land Shells occurring in the Environs of Bristol, with observations. Ann. Philos. vii. (1822) 377.

George MONTAGU.

Testacea Britannica. London, 1803. 4to. — Supplement. London, 1808. 4to.

Next to Müller, one of the best works on land and fresh-water shells.

John MORTON.

A Letter to Dr. H. Sloane, containing a relation of river and land shells, &c. near Mears Ashby, in Northamptonshire. Phil. Trans. xxv. 325.

Natural History of Northamptonshire. London, 1712. fol.

Thomas NUNNELEY.

A Description of the Internal Structure of various Limaces found in the neighbourhood of Leeds. Trans. of the Phil. and Lit. Soc. Leeds, i. (1837) 41.

C. I. and J. PAGET.

Sketch of the Natural History of Yarmouth, &c. Yarmouth, 1834, 8vo.

Thomas PENNANT.

British Zoology, 4th edit. 4 vols. 8vo., 1776, 1777.

J. PETIVER.

Musei Petiveriani, &c. London, 1695. 1703.

Gazophylacei Naturæ, &c. London, 1702. 1711.

Opera Omnia. London, 1764. fol. 2 vols.

R. PLOT.

Natural History of Staffordshire. Oxford, 1686. fol.

Natural History of Oxfordshire. Oxford, 1676. fol.

V. L. V. POTIEZ, and *A. L. G.* MICHAUD.

Galerie des Mollusques du Muséum de Douai. Paris, 1838. 8vo.

Figures of some Irish Shells sent by Mr. Thompson from Belfast.

R. PULTENEY.

Catalogue of the Birds, Shells, &c., of Dorsetshire, in Hutchins's History. London, 1799. fol. Edited by Mr. Racket. London, 1813. fol.

R. READING.

A Letter concerning Pearl Fishing in the North of Ireland. Phil. Trans. xvii. 659.

J. RUTTY.

Essay towards a Natural History of the County Dublin. Dublin, 1772. 8vo. 2 vols.

Rev. Revett SHEPPARD.

Descriptions of Seven New Species of Land and Fresh-water Shells, with Observations upon many other Species, including a List of such as have been found in the County of Suffolk. Linn. Trans. xvi. (1825) 148.

On Two New British Species of Mytilus. Linn. Trans. xiii. (1822) p. 83.

R. SIBBALD.

Scotia Illustrata. Edinb. 1684. fol.

An Account of Several Shells observed by him in Scotland. Phil. Trans. xix. 222. 321.

Ch. SMITH.

Ancient and Present State of the County and City of Waterford. Dublin, 1745. 8vo.

Ditto of Cork. Dublin, 1750. 8vo. 2 vols.

Ditto of Kerry. Dublin, 1756. 8vo.

G. B. SOWERBY.

On the Means of Distinguishing Fresh-water from Marine Shells. Ann. Philos. ii. (1821) 310.

Genera of Shells. 8vo.

John STARK.

Elements of Natural History. 2 vols. 8vo. Edinb. 1828.

C. STEWART.

Elements of Natural History. 2 vols. 8vo. Edinb. 1817.

Hugh E. STRICKLAND.

On the Naturalisation of Dreissena polymorpha in Great Britain. Loudon's Mag. of Nat. Hist. n. s. 1838, p. 361.

A List of some Land and Fresh-water Species of Shells found at Henley-on-Thames. Loudon's Mag. Nat. Hist. viii. 494.

W. TURTON. M. D.

Description of some New British Shells, accompanied by Figures from the original Specimens. Zool. Journ. ii. 361.

This paper contains the description of *Physa alba* and *Bulimus tuberculatus*, received from Mr. Blomer: Sicilian shells, and scarcely British.

Conchylia Insularum Britannicarum. The Shells of the British Islands systematically arranged. Exeter, 1822. 4to.

A Conchological Dictionary of the British Islands. London, 1819. 8vo.

A Manual of the Land and Fresh-water Shells of the British Islands. London, 1831.

George WALKER.

Testacea Minuta Rariora nuperrimè detecta in Arenâ Littoris Sandvicensis, à Gul. Boys; multa addidit et omnium Figuras delineavit G. Walker. Lond. 1784. 4to. —The text was written by Edward Jacob.

J. WALLACE.

A description of the Isles of Orkney. London, 1700. 8vo.

J. WALLIS.
  Natural History and Antiquities of Northumberland. London, 1769. 4to.
W. WOOD.
  Observations on the Hinges of British Bivalve Shells. Linn. Trans. vi. 154.
  Index Testaceologicus, with 2300 figures. London, 1825. 8vo.
  Supplement to Index Testaceologicus, with 480 figures. London, 1828. 8vo.

The following authors treat of European land and fresh-water Mollusca, and have been mostly consulted either for the geographical distribution or the Synonyma of the species.

J. W. V. ALTEN.
  Systematische Abhandlung über die Erd und Fluss-Conchylien um Augsburg. Augs. 1812. 8vo., with 14 coloured plates.
C. P. BRARD.
  Histoire des Coquilles Terr. et Fluv. qui vivent aux Environs de Paris. Paris, 1815. 12mo., with 10 coloured plates.
Collard de CHERRES.
  Shells of Finisterre. Act. Soc. Linn. de Bord, i. 4.
J. Ph. R. DRAPARNAUD.
  Histoire Naturelle des Mollusques Terrestres et Fluviatiles de la France. Paris, 1805. 4to., with 13 block plates.
Aud. de FÉRUSSAC.
  Histoire Naturelle, générale et particulière, des Mollusques Terr. et Fluv., &c. Paris, 1819. fol.
Gottfr. GARTNER.
  Versuch einer Systematischen Beschreibung der um

der Wetterau bisher entdeckten Conchylien. Hanau, 1813. 4to.

GOUPIL.

Histoire des Mollusques dans le Département de la Sarthe. 1835.

S. GRATELOUP.

Tableau Methodique des Mollusques Terrestres et Fluviatiles vivants observés dans l'Arrondissement de Dax. Bull. Soc. Linn. de Bordeaux, 1829, p. 111.

HARTMANN.

Syst. der Erd und Flussm. der Schweiz. Steinmüller, Neuer Alpina 1. Winterthur, 1821. 8vo.

KICKX.

Synopsis Molluscorum Brabantiæ.

KLEEBERG.

Molluscorum Borrussicorum Synopsis. Diss. Inaug. Regiomonte, 1828.

KLEES.

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ARTIFICIAL TABLE

OF THE GENERA OF BRITISH LAND AND FRESH-WATER SHELLS.

THIS table is merely intended to assist the student in the discovery of the genera, without any reference to their natural relations. The numbers refer to their situation in the body of the work.

I. UNIVALVES. Shells consisting of a more or less conical valve.

A. Shell flat, solid.

7. **LIMAX.** Shell oval or oblong, without any visible spire.

B. Shell conical.

26. **ANCYLUS.** Shell conical, apex recurved rather to the right.

27. **VELLETIA.** Shell conical, compressed; apex subcentral, bent to the left.

C. Shell ear-shaped, solid.

9. **TESTACELLUS.**

D. Shell conical spiral.

a. Shell thin, edge of lips not thickened or reflexed, peristome not continued.

* *Mouth transverse, lunate; shell depressed.*

8. **VITRINA.** Shell imperforated; mouth large.

11. **ZONITES.** Shell perforated, or umbilicated; mouth moderate.

(Helices, Pupa, Clausilia, &c., *when young*.)

* * *Mouth longitudinal, dextral.*

† *Pillar-lip smooth, not folded.*

12. **Succinea.** Shell oval, amber-coloured; mouth large; front entire, rounded.

13. **Bulimus** (acutus). Shell turreted, white, variegated; mouth moderate; front entire, rounded.

16. **Achatina.** Shell turreted, white; mouth moderate; front truncated.

† † *Pillar with an oblique fold.*

24. **Limnæus.** Shell ovate or subturreted, perforated; inner lip not expanded.

25. **Amphipeplea.** Shell ovate, very thin, imperforated; inner lip rather expanded.

* * * *Mouth longitudinal, sinistral.*

† *Pillar-lip smooth; shell very thin, imperforated.*

28. **Physa.** Shell ovate; inner lip rather expanded.

29. **Aplexus.** Shell turreted; inner lip not expanded.

† † *Pillar-lip with an oblique fold.*

24. **Limnæus** peregar lineatus. A monstrosity.

b. Shell moderately thick; peristome not thickened, continued.

* *Shell grooved, variegated, ovate; mouth suborbicular.*

32. **Cyclostoma.**

* * *Shell smooth, olive; mouth ovate or orbicular.*

5. **Valvata.** Shell conical or depressed, umbilicated; mouth orbicular.

3. **Paludina.** Shell ovate, conical, perforated, olive, banded; mouth ovate.

4. **Bithinia.** Shell ovate, conical, perforated, transparent; mouth ovate.

2. **Assiminia.** Shell ovate, conical, solid, brown; mouth ovate.

22. **Acme.** Shell subcylindrical, blunt, solid, brown; mouth ovate.

* * * *Shell smooth, half-ovate; mouth half circular; inner lip transverse, acute.*

1. **Neritina.**

c. Shell moderately thick; edge of lips more or less thickened and reflexed.

* *Mouth transverse.*

10. **Helix.** Shell suborbicular or conical; mouth lunate, or ovate or circular.

* * *Mouth oblong, longitudinal.*

13. **Bulimus.** Shell oblong, striated; mouth toothless.

14. **Zua.** Shell oblong, polished; mouth margined, toothless.

15. **Azeca.** Shell oblong, polished; mouth margined, toothed.

21. **Carychium.** Shell oblong, smooth, white; mantle oblong, margined, sinuous.

23. **Conovulus.** Shell oblong, smooth; mantle narrow; pillar obliquely plaited.

17. **Pupa.** Shell subcylindrical, striated, blunt; mouth margined, mostly toothed.

18. **Vertigo.** Shell subcylindrical, striated, blunt; mouth dextral or sinistral, margined, mostly toothed.

19. **Balea.** Shell turreted, striated; apex acute; mouth sinistral, not plaited.

20. **Clausilia.** Shell fusiform, striated; apex acute; mouth sinistral, plaited.

E. Shell discoidal; whorles revolving nearly on the same line.

* *Mouth lunate, sinistral, edge not continued.*

30. **Planorbis.** Cavity simple.

31. **Segmentina.** Cavity crossed with transverse ridges.

* * *Mouth circular, dextral, edge continued.*

5. **Valvata.**

II. BIVALVES. Shell formed of two valves, connected together by a ligament on the dorsal edge.

* *Shell with diverging hinge-teeth; inside not pearly.*

33. CYCLAS. Shell oblong, nearly equilateral.
34. PISIDIUM. Shell ovate, inequilateral.

* * *Shell with irregular hinge-teeth; inside pearly.*

37. UNIO. Shell with distinct posterior lateral laminar teeth.
36. ALASMODON. Shell without any lateral teeth.

* * * *Hinge toothless.*

35. ANODON. Shell ovate, pearly; umbones (dorsal) blunt.
38. DREISSENA. Shell triangular, not pearly; umbones (anterior) acute.

In describing shells, they should be regarded in their natural position; that is to say, in the way in which they are placed on the animal; thus, the part of the shell over the head of the animal is called the front, and that over the tail the back, of the shell; and the left and right sides of the shell correspond with the left and right sides of the animal.

This is exceedingly easy to be determined in the univalve shells, because the apex of the shelly cone, whether it be simply conical or spiral, in all univalves (except *Patella* and *Lottia*) is over the hinder part of the animal; therefore, if a shell is placed on its mouth, with the apex towards the spectator, the parts of the shell will correspond with the position of the person who is looking at it.

As all shells are formed of a shelly cone (which, when very long, is generally rolled round an imaginary axis, for the purpose of diminishing the space that it occupies; but when it is short, is sometimes only slightly recurved, as in the *Ancylus* and *Velletia*), in order to maintain a similarity of terms for the same thing in these two forms, all the lines or grooves which pass from the apex of the cone to the mouth, and which are caused by some permanent modifications of the edge of the mantle, are called longitudinal or spiral, and all the lines which are parallel to the edge of the mouth of the shell, and which, in fact, are generally marks of its growth, or are caused by some periodical development of the margin of the mantle, are designated as concentric or transverse. Thus the striæ on the *Cyclostoma elegans* and *Planorbis albus* are longitudinal or spiral, and the *lamellæ* on *Helix lamellata* and *H. aculeata* are concentric or transverse.

But when we speak of the spiral shell as a whole, it is usual to call it short or elongate, according to the length of the imaginary axis on which the whorles are rolled; and when we speak of the length of the mouth, it extends from the line which forms the front to the hinder edge of the mouth, which, in the *Ancylus*, occupies the whole length of the shell: the breadth is the line which crosses this at a right angle.

It is equally easy to determine the natural position of the bivalves without the presence of the animal; for the ligament is always placed on the dorsal surface of the animal, and the mouth is placed on that side of the apex of the valve, or *umbo*, which is before the ligament. Consequently, if a bivalve shell is placed on the table, with its hinge-side uppermost, and with the ligament towards the observer, the shell will be in its natural situation, and the sides of the shell will agree with the sides of the observer.

It is to be remarked that Linnæus, and the naturalists of his school, described what is here called the front of the shell as the back, the left valve as the right, and *vice versâ ;* and Lamarck, in general (but not universally), followed the same rule. The method above described is, however, so obviously correct, and every other so liable to confusion from the want of a sound foundation, that it cannot fail, sooner or later, to be universally adopted.

SYSTEMATIC DISTRIBUTION.

Mollusca is the name given to that large division of the animal kingdom which is characterised by having a soft fleshy body, destitute both of a bony skeleton supporting jointed limbs, and of a hard ringed skin.

They are covered with a muscular coat, called a *mantle*, endued with a glairy humour, and are generally furnished with a calcareous envelope called a *shell*, which is secreted by this coat for the protection of the body or of the more vital organs of the animal.

They are generally elongate, walking on a single central foot or disk, and furnished with one or more pairs of organs on the head and sides. Their nervous system, which furnishes the most distinctive character of the larger groups of the animal kingdom, merely consists of a certain number of medullary masses distributed to different parts of the body; one of the masses being placed over the gullet, and enveloping it like a collar.

This division of the animal kingdom is subdivided into five classes in the following manner: —

A. *Crawling on a foot placed under the body.*

I. *Gasteropodes*, which have a distinct head, furnished with eyes and tentacles, and are usually protected by a conical spiral shell.

II. *Conchifers.* — Having the mouth placed between the gills, they and the body enclosed between the two leaves of the mantle, which are covered with two shelly valves united by a cartilage.

B. *Destitute of any foot.*

III. *Brachiopodes.* — Having the mouth placed at the base of two spirally twisted ciliated arms, between the two leaves of the mantle, which are covered with two separate shelly valves: they live attached to other marine bodies.

IV. *Pteropodes.* — Having a prominent head, with one or two pairs of fins on the sides of the neck, by which they swim about in the ocean. The body is often covered with a thin glassy conoidal shell.

V. *Cephalopodes*, which have a large distinct head, furnished with eight or ten arms, by means of which they walk head downwards.

Linnæus refers all the animals inhabiting shells to five different genera; viz., *Limax*, *Ascidia*, *Anomia*, *Clio*, and *Sepia*. These genera may be regarded as the types of the classes proposed by Cuvier. Poli had, before his time, considered three of them as orders, under the names of *Mollusca Reptantia*, *Subsilientia*, and *Brachiata*. (i. 27.)

The terrestrial or fluviatile Mollusca, of which alone we have to treat in this little work, are confined to the two first of these classes.

The shell, which is peculiar to this division of the animal kingdom, may be seen covering the young animal in the egg, before it has gained all its organs, as was observed by Swammerdam, and verified by the more extended observations of Pfeiffer, Turpin, and others. They are easily seen in the egg of the *Limnæi*, *Physæ*, *Ancyli*, and *Bithiniæ*, which have a transparent coat. (See *Phil. Trans.*, 1833.)

The shells of the newly-hatched animals have been frequently considered as distinct species, and some very thin shells of land Mollusca, such as *Vitrinæ*, have been taken for the young of other well-known species, as *H. hortensis*. These young shells are easily known by their always being of a pale horn colour; the whorles are generally rather irregular, and enlarge very rapidly; and the apex of the whorl which was first formed is generally large and blunt, compared with the size of the shell. They are always destitute of colour, for the animal does not deposit the colouring matter until after it has been hatched; and it is therefore generally easy to distinguish in the young shell (and sometimes also in the adult) that part of the top of the spire which formed the shell of the animal when in the egg.

The shell is formed by the hardening of the animal matter, which is secreted by certain glands on the surface of the body, by means of chalky matter, which is also secreted by similar glands. It has been stated that the unhatched animal, very shortly after it is formed, begins to make its shell; and when it is hatched, deposits on the edge of the mouth of the little shell which covered its body in the egg a small quantity of the mucous secretion. This dries, and is then lined with some mucous matter, intermixed with calcareous particles; and when this hardens, it again places on its edge another very thin layer of the mucous secretion, and again lines it as before. The mucous secretion first deposited forms the outer coat of the shell, and is of use in protecting it from injury, while the mucous matter mixed with lime, which is placed within it, forms the substance of the shell itself. This deposition of mucus, and of mucus mixed with calcareous matter, goes on as the animal grows and feels the want of a larger shell for its protection: the shell is, in fact, moulded on the body of the animal itself, as the body grows; and for this reason any irregularity in the body is moulded in the shell.

The animal has the faculty, also, of mending any break or injury that its shell may have received, if it is not of such a magnitude as to derange all the functions of the animal itself; and it mends them in the same manner as it forms its shell; that is to say, by depositing first a coat of animal matter, and then lining it with mucous matter, mixed with chalk, to harden it. But as the animal is usually very desirous of getting the repairs done as quickly as possible, and is most probably damaged by the injury it has received, these repairs are generally much more roughly executed than the shell itself, and commonly destitute of regular colour.

The particles which vary the colour of the surface of the shell are deposited while the shell is being increased in size, immediately under the outer mucous coat; and as these particles are also secreted by peculiar glands, the colour is always situated in a particular manner on each species, the glands being gradually enlarged, and gradually separated, but not changed in position by the growth of the shell.

All the variations exhibited in the colouring of the different species, or in the different individuals of the same species, are produced by the permanent or temporary interruption of the action of these glands. But for a more detailed account of these phenomena, I must refer the reader to my papers on the subject in the *Philosophical Transactions* for 1833.

OF CRAWLING MOLLUSCANS.

Class I. GASTEROPODA *Cuv.*

The animal is furnished with a distinct head, two or four tentacles, and a broad expanded foot for locomotion; and is generally protected by a straight, oblique, or spirally-twisted conical univalve shell. This class is divided into orders, according to the form of their respiratory organs; thus:—

A. *The gills comb-like, formed of a ridge of plates or filaments, on the inner side of the mantle, over the back of the neck.* (Ptenobranchiata.)

I. *Zoophaga*, the edge of the mantle produced into a siphon.

II. *Phytophaga*, the edge of the mantle simple.

B. *The gills variable, arborescent, or the respiratory organs in the form of lungs.*

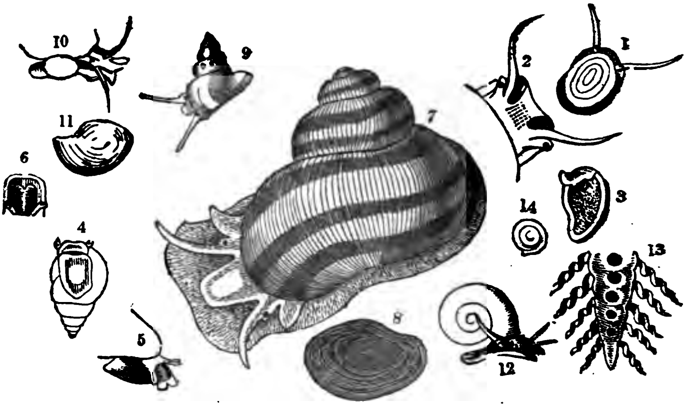
III. *Pleurobranchiata*, the gills on the side of the body, under the edge of the mantle.

IV. *Gymnobranchiata*, the gills naked on the back, or round the inner edge of the mantle.

V. *Pneumobranchiata*, the respiratory organs consisting of a bag formed by the mantle, and lined with the pulmonary vessels.

The last order consists almost entirely of terrestrial or fluviatile Mollusca, their organisation being only adapted for respiring free air; and there are a few fluviatile species found in the second order: the rest are all marine, and therefore excluded from our consideration at present.

ORDER I. *PHYTOPHAGA.*



1. 3. Neritina fluviatilis.
4. 6. Assiminia Grayana.
7. 8. Paludina vivipara.

9. 10. Bithinia tentaculata.
12. 14. Valvata cristata.
3. 8. 11. 14. The opercula.

THE gills are in the form of one or more comb-like ridges of plates or filaments on the inner side of the mantle over the back of the neck. The edge of the mantle is entire, and destitute of any syphon. They respire water, or more properly air, through the water, and they are unisexual, and have only two tentacles; their mouth is usually at the end of a short proboscis, and they live chiefly on vegetable food.

The shells have an entire roundish or semilunar mouth, without any canal in front. They are provided with an operculum, which covers the mouth of the shell upon the animal, and which, from its position and the manner of its formation being similar to that of the shell, may be considered as a free second ~~on~~valve.

This order is divided into groups, by the position of the eyes, and the absence or presence of tentacles on the side of the body.

Sect. I. *Podophthalma*

Have the eyes placed on a separate pedicel at the hinder edge of the tentacles: the heart is generally traversed by the rectum, as in the Conchifera.

Fam. 1. *Neritidæ.* The sides of the body simple: shell ovate; mouth half-ovate, with an acute inner lip; operculum appendaged. (f. 1—3.)

Sect. II. *Eriophthalma.*

Eyes of the animal sessile at the base of the tentacles: diœcious.

Fam. 2. *Melaniadæ,* — animal; trunk elongate: shell ovate; mouth ovate, not continued; operculum horny, ovate, spiral. (f. 4—6.)

Fam. 3. *Paludinidæ,* — animal; gills enclosed: shell conical; mouth ovate, continued; operculum annular. (f. 7—11.)

Fam. 4. *Valvatidæ,*—animal; gills exserted: shell conical; mouth round, continued; operculum horny, orbicular, many-whorled. (f. 12—14.)

Fam. 1. NERITIDÆ.

The sides of the body simple, without any elongated filaments; tentacles awl-shaped, eyes on short pedicels at the outer side of their base (p. 78. f. 1, 2.); the shell ovate-conical; mouth half-ovate, with a flattened transverse sharp-edged inner lip; the operculum spiral, half-ovate, and furnished with two internal processes on its front edge, forming a kind of hinge on the sharp edge of the inner lip of the shell. See p. 78. f. 3.

The peculiar structure of the operculum makes this family more closely resemble the bivalve shells: the processes appear to answer the same purpose (that of keeping the two parts in their proper situation) as the teeth of the hinges in the bivalves.

In the exotic genus *Navicella*, which, on account of its large mouth, has been confounded with the *Patellæ*, the processes occupy the greater part of the operculum.

There is only a single fluviatile genus of this family found in Britain.

1. 1. Neritina *Lam.* (Neritine.)

Shell half-ovate, thin; inner lip slightly toothed; operculum only slightly calcareous, and furnished with a sharp flexible outer edge; foot short, rounded at each end. This genus is separated from the marine *Nerita* by the pillar being sharp, only slightly denticulated, and the outer lip not being toothed within.

Neritina is the diminutive of *Nerita*, the ancient name of a sea-shell.

The greater part of the species are confined to fresh-water streams, but one of the North American species is found for 200 miles up a river, from the mouth where it is quite salt, to beyond the reach of the tide, where the water is perfectly fresh. One species (*Neritina viridis*) is only found in the sea. (See *Phil. Trans.* 1835.)

M. Deshayes and several other conchologists, especially those who only study the external form of shells, have proposed to unite this genus to the *Nerites*, because some of the species are marine, and some of the fluviatile species have a tooth on the pillar lip. The genera are, however, very distinct; and they may be well characterised by the structure of the operculum. (See *Phil. Trans.* 1833, p. 814.) The operculum of the *Neritinæ* is solid, shelly, and furnished with a thin flexible outer edge; that of the *Nerites* is horny, covered on both sides with a hard shelly coat. The position of the horny operculum is shown by a groove in the edge between the two coats; and if a knife is inserted, the coats can be separated from the operculum.

As the periostraca is essential to the structure of the shell, and is always present, some shells being formed of scarcely any thing else, so it is with the operculum, the horny part similar to the periostraca of shells being always present, and forming its essential part, and a shelly coat being in some instances added to the outer surface, as in *Turbo* and *Phasianella*, or to the inner surface, as in this genus, in which the horny part is very thin and scarcely visible, except where the shelly coat is very thin, as at the flexible edge.

These animals absorb the septa which separate the whorls of the spire, when they have arrived at their full size, so as to allow more room for the spiral body, without increasing the size of the shell; and this can be done without endangering the strength of the shell, as only a very small part of the whorl is exposed on the surface. A similar absorption is to be observed in many *Auriculidæ*, and to a less extent in the *Cones*, where the septa are only reduced in thickness. (See *Phil. Trans.* 1833, p. 798.)

This absorption is only superficial, and produced by that portion of the surface of the mantle which lies close to it, and is not to be confounded with the absorption of the bones of vertebrated animals, where it is produced by vessels which ramify in the substance of the bone, and which are accompanied by other vessels to replace with new portions the part which has been removed.

The apices of the spires of these shells are sometimes eroded; those are more so which live in stagnant or nearly stagnant waters. The late Mr. Sowerby (*Min. Conch.* iv. 49.) supposed that this was produced by "some acid developed during the fermentation of vegetable matter in marshes or at the bottoms of the rivers." Others, who were not aware how the animals walked, have said that this erosion of the apex was produced by the animal rubbing it against the ground in progression; explaining also the erosion of the umbones of the *Uniones* in the same manner.

1. 1. NERITINA *fluviatilis*. River Neritine. (t. 8. f. 124.) Shell convex, dilated, tessellate, with variously coloured spots; spire short, lateral.

Neritina fluviatilis. *Lamarck*, vi. ii. p. 188.; *Flem. B. A.* 321.; *Turton, Man.* ed. 1. 138.

Nerita fluviatilis. *Linn. S. Nat.* 1253.; *Müller*, ii. 194.; *Drap.* p. 31. t. 1. f. 1—14.; *Brard*, p. 194. t. 7. f. 9, 10. 12.; *Mont.* p. 470.; *Turt. Dict.* 127.

Theodoxus Lutetianus. *De Montfort*, ii. p. 351.

Neritina fontinalis. *Brard, Hist. C.* 196. t. 7. f. 11. 13.; *Pet. Gaz.* t. 91. f. 3.; *List. Conch.* ii. 1, 38.; *Swamm. B. N.* 80. t. 10. f. 2.

Neritina Dalmatica. *Sow. C. Illus.* f. 57.

In slow rivers, adhering to stones.

Animal white; head and back of the neck blackish; hinder part of the foot sometimes black spotted; tentacle long, white, with blackish line.

Shell about three eighths of an inch long, and two broad, convex above and flat underneath, obscurely striate transversely, of a greenish or whitish colour, variously checquered with spots or bands of white, brown, purple, or pink; spire consisting of three volutions, the first very large, oblong, and oblique, the others small and lateral; aperture horizontal, semielliptic, with the margin sharp and entire; pillar white, transverse, sloping down to a sharp edge, and quite entire; operculum semilunar, yellowish, with an orange border, and underneath is a strong raised grooved spire at one end.

The shells are often covered with calcareous incrustations, deposited by the water, which make them look like pieces of dirt, and thus escape being seized on by the fish.

The continental conchologists have described several species allied to the above. Rossmäsler reduces them to three; but, from the specimens which I have received under different names, I greatly doubt if they are more than mere local varieties of our species. Nilson found a small variety or species in Sweden, on the shores of the Baltic, with *Mytilus edulis*, *Cardium*, &c. Our species has been found in similar situations in Loch Stennis, Orkney, by Mr. Edward Forbes.

Fam. 2. MELANIADÆ.

Shell ovate, turreted; mouth ovate; operculum free, horny, ovate, spiral. The trunk of the animal is more or less elongate, with 2 subulate tentacles, with the eyes sessile on the outer sides of their base.

This family contains only one rather anomalous British fresh-water genus among its numerous marine ones. There are several other fluviatile genera, as *Melania*, *Melanopsis*, and *Potamides*, which are now only found in the warmer parts of the world, that were once inhabitants of these regions, as they are found in the fossil beds of the Isle of Wight, and the coast of Hampshire.

2. 1. ASSIMINIA *Leach MSS.* (Assiminia.)

Shell ovate, conical, solid; mouth ovate; tentacles very short, scarcely larger than the tubercles on which the eyes are placed, and united to their side. (p. 78. f. 4, 5, 6.)

The animal differs from *Littorina* in the apparent position of the eyes, which is an anomaly among the water or Ptenobranchous Mollusca.

This animal was first indicated, and its peculiarites pointed out, in my paper above quoted, in 1821; when I made the following remarks on its structure. "The animal of this shell differs from all others of the order (to which it belongs), by the eyes appearing to be placed at the end of the tentacle; but I believe that they are placed on a peduncle as long as the tentacle, and the peduncles and tentacula are soldered together."

Mr. Berkeley, in his description of the animal (*Zool. Journ.* v. 429.), observes, — "The most remarkable circumstance in this animal is the position of the eyes at the tip of the tentacle, as in *Helix* and its allies, and not at the base. It would appear as if there were in reality no tentacula, and only the tubercle, common to many Mollusca, at the base of the tentacula, a little more developed than usual." I am inclined to retain my former theory; for if the pedicel of the eye of this genus is minutely examined, it will appear to be formed of two parts united by a suture.

A shell which I described from India, under the name of *Turbo Francesia* (Wood, Supp. t. 6. f. 28.), has been found by Mr. Benson to have the same kind of animal, and to be a second species of the genus.

2. 1. ASSIMINIA *Grayana.* Liver-coloured Assiminia. t— f. 127. Shell ovate, acute, solid, liver-brown; suture slightly impressed; mouth ovate.

Nerita Syncera hepatica. *Gray, Med. Repos.* 1821, p. 239.

Assiminia Grayana. *Leach, MSS.* 1816; *Flem. B. A.* 275.; *Berkeley, Zool. Journ.* v. 429. t. 19. f. 4.

Lymneus Grayanus. *Jeffreys, Linn. Trans.* xvi. 378.

Paludina Grayana. *Potiez, Gal.* i. 251. t. 25. f. 23, 24.

Inhab. the mouths of rivers and small streams connected with them, seldom out of the reach of brackish water.

Foot broadly obovate, obtuse, compressed, evidently of two distinct laminæ, the lower projecting beyond the upper, and separated from it by an accurately defined line; above fuscous, beneath olivaceous, shaded with cinereous; tentacles very short and obtuse, fuscous, eyes at their tips; muzzle porrect, not truly proboscidiform, deeply notched in front, fuscous, strongly annulated; the edge of the lips paler: on each side is a groove running backwards from the base of the tentacula.

Shell about ¼ inch long, ovate, solid, bright, shining, liver-brown, with a conical spire, and slightly impressed suture. The axis is imperforated. Operculum horny, ovate, black-brown.

Very like the small *Littorinæ*, but more solid, and differs in the animal; it is curious that so abundant a shell should have been overlooked by Montagu and his correspondents.

There may be noticed two marine species, sometimes found with the former.

1. LITTORINA *anatina.*

Paludina anatina. *Drap.*, *Michaud*, *Alder*, *Mag. Zool. and Bot.* ii. 116.

Sometimes found in the marshes at Greenwich, with the *Assiminia Grayana.* The shell is ovate, perforated, thin, transparent; the whorles are ventricose, rounded, and the mouth ovate; the operculum is horny, brown. It is like *Bithinia ventricosa*, but smaller and shorter, and has a horny spiral operculum, like the periwinkle; the peristome is continued; the shell is often covered with green *Algæ.*

2. LITTORINA *muriatica*.
Turbo muriaticus *Linn.*
Cyclostoma acutum *Drap.*

Which has been placed by the latter author as a fresh-water species, is abundant on many parts of our coasts. It is nearly allied to *Littorina ulvæ*. Hartmann has formed a genus called *Hydrobia* from these small Littorinæ.

Fam. 3. PALUDINIDÆ.

The tentacles elongate, slender, with eyes sessile at the outer side of their base (p. 78. f. 7. and 9.); the gills are always enclosed in the gill cavity. Shell conical, thin, covered with an olive periostraca; mouth ovate, entire, angular behind; the peristome continued; operculum horny or shelly, formed of concentric laminæ, with a subcentral nucleus. (p. 78. f. 8. and 11.) They are all fluviatile.

The animals were confounded by Lamarck, in his first works, with the genus *Cyclostoma*; and Draparnaud has placed in this genus some marine species which belong to *Littorinæ*; Cuvier, overlooking the character of the operculum, and some other peculiarities in the animal, confounded them with the animals of that genus. (See *Règ. Anim.* and *Mém. Moll.*)

This family, unlike most of the families of Ptenobranchous Mollusca, consists entirely of truly fluviatile animals.

It has many characters in common with the exotic family of apple-snails (*Ampullariadæ*), which also have an annular operculum; but these have pedicelled eyes, very long tentacles, very long subulate lips, and are furnished with an air-bag on the side of their gills.

It contains two British genera, which, though very distinct and easily characterised, have been generally confounded, viz.: —

1. *Paludina.* Operculum horny; mouth of the shell thin.
2. *Bithinia.* Operculum shelly; mouth of the shell thickened internally.

3. 1. PALUDINA *Lam.* (Marsh Shell.)

Operculum horny, the nucleus rather on the inner side (p. 78. f. 8.); shell conoid or oblong; mouth roundish, slightly angular behind; peristome united all round, thin. (p. 78. f. 7.)

They are called *Paludinæ* from their being found in marshes and ditches.

The animals are viviparous, the young being hatched while the eggs are in the oviduct of the mother.

The shells of the newly-hatched individuals are covered with spiral bands of cilia.

3. 1. PALUDINA *vivipara.* Crystalline Marsh Shell. (t. 8. f. 118.) Shell thin, oval, acute, volutions five, much inflated, with three brown bands; the suture deeply impressed; spire blunt mucronate.

Helix vivipara. *Linn. Fauna Su.* 529.; *List. Ang.* t. 2. f. 17.; *Petiv. Mus.* 84. n. 814.; *Montagu, T. B.* 386.

Paludina crystallina. *Gray, Med. Rep.* 1821, p. 239.

Nerita fasciata. *Müller Verm.* ii. 182. part.

——— vivipara. *Müller,* ii. 182.

Cyclostoma viviparum. *Drap.* 34. t. 1. f. 16, 17.

Paludina vivipara. *Lam.* vi. 173.; *Nilson,* 88.; *Turton, Man.* ed. 1. 133. f. 118.; *Brard,* 174. t. 7. f. 1.; *Rossm.* f. 66.; *Desh.* viii. 511.

Viviparus fluviorum. *De Montf.* ii. 247.
Paludina achatina. *Sow. Gen.* f. 1.
Cyclostoma contectum. *Millet, Milf.* 5.

In still waters and slow rivers.

Shell an inch and a quarter long, and an inch broad, thin, transparent, finely striate longitudinally, of an olive colour, with three brown bands on the larger volution; spire composed of five inflated and deeply divided volutions, the last very large, the first a mere point; aperture pear-shaped, a little produced at the upper angle; the inner lip a little reflected so as to half close the umbilicus. The young shells are subglobose, pellucid, obscurely banded, rather flattened above, and furnished with five ciliated lines.

4. 2. PALUDINA *achatina.* Common Marsh Shell. (t. 8. f. 119.) Shell rather thin, conic-oval, acute; volutions six, rather tumid, with three olive-brown bands; the sutures well defined.

Helix vivipara. *Linn. S. N.* part.
—— ventricosa. *Oliv. Ad.* 178.
Paludina vulgaris. *Gray, Med. Rep.* 1821, p. 239.
——— fasciata. *Desh., Lam.* vii. 513.
Lymnea vivipara. *Flem.*
Nerita fasciata. *Müller, Verm.* 182.
Cyclostoma achatinum. *Drap.* 36. t. 1. f. 18.
Turbo achatinus. *Sheppard, Linn. Trans.* xiv. 125. t. 1. f. 18.
Paludina achatina. *Brug. E. M.* t. 458. f. 1.; *Lam. H.* vii. 174.; *Rossm.* 109. f. 66*.; *Turton, Man.* 133. f. 119.
Helix vivipara b. *Gmelin, S. N.* 36. 46.
Nerita fasciata. *Sturm, Faun.* vi. 2. t. 12.

Young shell with numerous hairy bands:
Helix compactilis. *Pulteney.*
Very young shell.
Vitrina femorata. *Auctor.*

Inhab. rivers.

Shell resembling the last, but of a more oblong shape, with six volutions, which are not so much swollen, and consequently the sutures are not so deep. The young shells are furnished with numerous close ciliated spiral lines. Lister gives the anatomy of the former species, and Cuvier of this (t. 6. f. 1. 4.), in the *Mém. Mollusques.*

Though Lister has figured the two species as found in Britain, they had been confounded by English conchologists until I noticed them in the *Medical Repository* for 1821, when I also pointed out that they were known to Lister, and that the young shell of the two species offered the very different characters noticed in their descriptions. They are sometimes found together in the same river, as at Uxbridge, Middlesex.

Müller, in his figures of this animal, in the *Zoologia Danica*, represents two small processes at the hinder part of the opercular mantle, as in the animal of *Lacuna*. Can he have represented a specimen of that genus, by mistake, for he has figured the animal as red?

4. 2. Bithinia *Gray.* (Bithinia.)

Operculum lined internally with a thick shelly coat; nucleus subcentral (p. 78. f. 11.); the mouth of the shell ovate, continued, rather angular behind, with a slightly thickened internal rib. (See p. 78. f. 9, 10.)

These animals are oviparous, their eggs being deposited in oblong groups, like the *Limnæi* or Pond Snails, on the stems and leaves of fresh-water plants. (See *Pfeiffer*, *Moll.* t. 6. f. 10, 11, 12.)

5. 1. Bithinia *tentaculata*. Tentacled Bithinia. (t. 8. f. 120.) Shell oval-oblong, yellowish horn-colour, smooth, semitransparent, with five rather flat volutions, and without umbilicus.

Helix tentaculata. *Linn. Fauna Suec.* 531. (*List. Ang.* t. 2. f. 19.); *Gmel.* 3662.; *Mont.* 389.

Bulimus tentaculatus. *Poiret*, 61.

Lymnea tentaculata. *Flem.*

Nerita jaculator. *Müller*, *Verm.* ii. 185.

Turbo nucleus. *Da Costa*, t. 5. f. 12.

Paludina tentaculata. *Flem.*

——— impura. *Lam.* vi. 175.; *List. Conch.* t. 132. f. 32.; *Brard*, 183. t. 7. f. 2.; *Turton*, *Man.* 134. f. 120.

Cyclostoma impurum. *Drap.* 36. t. 1. f. 19.; *Sturm*, *Fauna*, t. vi. 3. 1.

Young.

Turbo lævis. (?) *Walker*, f. 33.

Nerita sphærica. *Müller.*

Var. 1. Shorter, less, and more conical. *Drap.* t. 1. f. 20.

In ditches and canals; common all over Britain.

Animal blackish, with golden dots; foot two-lobed in front, narrow and subacute behind; tentacle setaceous, long; the eyes black.

Shell half an inch long, and three tenths wide, often covered with a blackish foul coat; spire composed of five volutions, the first very tumid, the others hardly raised; pillar without umbilicus.

6. 2. **Bithinia** *ventricosa.* Ventricose Bithinia. (t. 8. f. 121.) Shell conic, yellowish horn-colour, smooth, semi-transparent, with five very tumid volutions, and a small oblique umbilicus.

Bithinia ventricosa. *Gray, M. Rep.* 1821, p. 239.
Turbo Leachii. *Sheppard, Linn. Trans.* xiv. 152.
Paludina acuta. *Fleming.*
Cyclostoma simile. *Drap.* 31. t. 4. f. 15.?
Paludina ventricosa. "*Leach, MSS.*;" *Sheppard, Brown, Brit. Shells,* t. 41. f. 74, 75.
Paludina humilis. *N. Boubée, Cat.*
——— similis. *Turton, Man.* 135. f. 121.; *Alder, Mag. Zool. and Bot.* ii. 116.

In ditches and canals; south of England.

Shell a quarter of an inch long, and two lines broad, with four or five very tumid volutions; aperture dilated, nearly circular, projecting more outwardly, or out of the line of the columnar axis, with a small umbilicus behind it.

The lower volutions are sometimes decussated, the horizontal striæ being the deepest. See *Linn. Trans.* xiv. 152.

The fry, or mass of egg, of this species, are disposed on a tough strap-shaped green membrane, in a double row, consisting of six or seven pairs placed opposite to each other; and this elongated receptacle is fixed to the under surface of aquatic plants.

This species was first added to the list, in the *Medical Repository* for 1821. Mr. Sheppard received it from Dr. Leach, under my name, but he changed it to *T. Leachii.* I do not think it is *C. simile* of Draparnaud: in Dr. Turton's figure, the volutions are scarcely sufficiently ventricose.

Dr. Beck tells me that this shell is *Nerita globulosa* of Müller: it does not well agree with his description. We have received it from Tarbes in France, from M. N. Boubée, under the name of *P. humilis.*

Mr. Alder observes (*Mag. Zool. and Bot.* ii. 116.), "The *Paludina viridis* of Turton's Manual (ed. 1. 135, f. 122.) I take to be the young of *P. similis* (*Bithinia ventricosa*), judging from specimens in Mr. Clark's cabinet." Most probably this idea is correct, as I have not been able to find any authority for Draparnaud's species being found in this country; and it is to be remarked that Turton's account is taken from Draparnaud, and Dr. Turton does not give any habitat for the species. M. N. Boubée's specimen of *Pal. viridis* proves it to be a *Hydrobia* or minute *Littorina*: it has a horny subspiral operculum.

Mr. Alder also thinks that the *Paludina stagnorum* Turton, Man. (ed. 1. 136. f. 123.) may probably be a mere slender variety of *P. similis.* (*Mag. Zool. and Bot.* ii. 116.) I think it is much more probably a *Littorina*, as he considers it the same as *Paludina acuta* of Drap. In the absence of specimens, it is impossible to decide; and, as Dr. Turton does not give any locality, it is even doubtful if the whole account of the species and figures were not derived from Draparnaud's work. If intended for any British species, it must be *Littorina ventricosa*, which is common in the ditches with *Cardium edule*, &c., near Tilbury Fort.

Fam. 4. VALVATIDÆ.

The tentacles are elongate, tapering, rather blunt, with the eyes on small tubercles at the outer hinder side of their base; mouth rather proboscidiform; the foot truncated and slightly lobed in front, rounded and slightly nicked behind; the gills are exserted when the animal is expanded, and are formed of an elongate, tapering, conical process, furnished on each side with a series of spirally-twisted laminæ, placed opposite to each other. (p. 78. f. 13.) On the hinder part of the right side, near the suture of the whorls, is an exserted filiform member (p. 78. f. 12.) like a tentacle, but rather shorter and thicker, which is called the branchial thread by Lamarck.

The shell conical, thin, covered with an olive periostraca; the mouth round, with a continued peristome.

The operculum is horny, suborbicular, formed of many gradually enlarging whorls, which have a raised membranaceous outer edge, forming a spiral ridge on the outer surface. (p. 78. f. 14.)

The shells are known from Paludinæ by the shelly cone being circular, and not bent in in any part by the proximate whorls. They are like the marine genus *Skenia* of Fleming, which, however, has a different animal, very like that of *Rissoa* and *Hydrobia.*

These animals have been well described by Müller, Montagu, Nilson, Hartmann, and others. Montagu showed that *Turbo fontinalis*, which Müller had referred to *Nerita*, should be placed in the genus which Müller had established under the name of *Valvata*.

5. 1. VALVATA *Müller*. (Valve Shell.)

Shell with the spire a little elevated, or flat and disk-like; aperture quite circular, united all round, and furnished with a horny operculum marked with a single raised spiral membranaceous line. (p. 78. f. 14.)

So named from the valve or lid which covers the orifice of the aperture.

7. 1. VALVATA *piscinalis*. Stream Valve Shell. (t. 8. f. 114.) Shell globular, with an elevated obtuse spire, and a deep central umbilicus.

Nerita piscinalis. *Müller*, 172.
Valvata obtusa. *Brard*, p. 190. t. 6. f. 17.; *Turton, Man.* ed. 1. 130.; *Pfeiffer*, 198. t. 4. f. 32. t. 1. f. 13.
Cyclostoma obtusum. *Drap.* p. 33. t. 1. f. 14.
Turbo fontinalis. *Mont.* p. 348. t. 22. f. 4.
—— thermalis. *Dillwyn*, p. 852.
Helix piscinalis. *Gmel.* 3627.
Valvata piscinalis. *Lam.* vi. 172.; *Kenyon, Mag. N. Hist.* iii. 425. f. *b. c. d.*; *Alder, Mag. Zool. and Bot.* ii. 116.
Lymnea fontinalis. *Flem., Ed. Ency.*

Young rather depressed, umbilicus rather wider.

Helix fascicularis. *Alten Syst.* 74. t. 8. f. 16.
Valvata depressa. *Pfeiffer.*
——— minuta. *Pfeiffer.* ?

In canals and ponds; common to all parts of England.

Animal whitish; trunk grey rugose.

Shell nearly a quarter of an inch long and as much broad, globular, thin, light horn-colour, very finely spiral-striate, and marked with some obscure concentric lines; spire of four volutions, tumid, and deeply defined, and having much the appearance of a *Trochus*, with a deep central umbilicus; operculum dull greyish white.

Mr. Alder states that he received specimens of *V. depressa* of Pfeiffer, from Lancashire, some years ago, by Mr. Kenyon. They are exactly similar to those in M. Férussac's cabinet, received from Pfeiffer himself; but it can scarcely, he observes, be considered more than a variety of *V. piscinalis.* I think this opinion is fully borne out by the examination of some specimens which Mr. Kenyon has kindly sent to the British Museum collection. Nilson and Forbes agree in this opinion, and as the former justly observes, all conoid shells are more depressed in their young state, from the peculiarity of their formation. (See f. *a. b. c.*)

The animal and operculum are well described by Montagu (*Test. Brit.* 351.), who justly compared the animal to that of the next species, though in his arrangement one shell is a *Turbo* and the other a *Helix;* but he saw the difficulty of this arrangement. See his note at p. 367., and also at p. 461., where he describes the animal of *V. cristata.*

8. 2. VALVATA *cristata.* Crested Valve Shell. (t. ~~9~~ 10. f.

115.) Shell discoid, flat above, and umbilicate beneath; whorls 3.

Valvata cristata. *Müller, Verm.* 198.; *Alder, Mag. Zool. and Bot.* ii. 116.

Valvata spirorbis. *Drap.* p. 41. t. 1. f. 32, 33.; *Brard,* p. 187. t. 6. f. 15, 16.; *Turton, Man.* ed. 1. 131. f. 115.

Nerita valvata. *Gmel.* 3675.

Helix cristata. *Mont.* p. 46.; *Vign.* 1. f. 7, 8.

Turbo cristatus. *Turton, Dict.* p. 227.

Valvata planorbis. *Drap.* 41. t. 1. f. 34, 35.; *Turton, Man.* ed. 1. 132. f. 116. (?)

Junior. Valvata minuta. *Drap.* 42. t. 1. f. 36—38.; *Turton, Man.* ed. 1. f. 117.

In ditches and canals, on aquatic plants.

Shell about the tenth of an inch in diameter, pale horn-colour, striate transversely, with three volutions; the upper surface a little sunk, the under side umbilicate, so as to expose the interior volutions.

Mr. Alder observes (*Mag. Zool. and Bot.* ii. 117.), "Dr. Turton has introduced two other species, *V. planorbis* Drap. (f. 116.), and *V. minuta* Drap. (f. 117.), into his Manual, but no specimens of them are now to be found in his cabinet." Mr. Alder says he took some pains to investigate these two species when in Paris, on examining three of the principal collections there; those of the Jardin des Plantes, the Baron de Férussac, and the Duke de Rivoli. "In the latter only, I found any thing under the name of *V. planorbis.* The specimens (which were originally Lamarck's) were *V. cristata* Müller. M. de Férussac had specimens, under the name of *V. minuta,* from two different individuals. Those from M. Pfeiffer are, I think, the young of *V. cristata*, and the others (I forget from whom, but with the name of Draparnaud) the young of *V. piscinalis.* Mr. Miller introduced *V. minuta* into his catalogue of the land and fresh-water shells of the environs of Bristol, but no specimen of it is preserved in the Bristol Museum. Dr. Turton says, that his *V. minuta* is the *Helix serpuloides* of Montagu. This is well known to be a marine shell, referrible to the genus *Skenea* of Fleming. Mr. Thompson of Belfast has, however, favoured me," continues Mr. Alder, "with the examination of a shell which may possibly turn out to be the *V. minuta* Drap., though I suspect it to be marine."

ORDER II. *PNEUMONOBRANCHIATA.*

THE respiratory organs consisting of a number of pulmonary vessels spread over an open or closed bag-like cavity on the back of the neck, they breathe free air, and either live constantly on the land or in the water, in which latter case they come periodically to the surface to respire.

The shell is rarely wanting.

This order is divided into families in the following manner: —

Sect. I. *Inoperculated.* Edge of the mantle adherent to the back of the neck, forming a closed pulmonary chamber, leaving a hole for the entrance and exit of the air; operculum none; hermaphrodite.

A. *Terrestrial.* Tentacles cylindrical, retractile; upper pair having the eyes at their tip.

Fam. 1. *Arionidæ.* Head and tentacles retractile; end of the tail truncated, bearing a mucous gland.

Fam. 2. *Helicidæ.* Head and tentacles retractile; end of tail simple, conical.

B. *Aquatic,* Tentacles contractile, with the eyes at or near their base,

Fam. 3. *Auriculidæ.* Head elongated into a rugose muzzle; tentacles subcylindrical, eyes near the inner side of their base.

Fam. 4. *Limnæidæ.* Head bifid; tentacles compressed, with the eyes on the outer side of their base.

Sect. II. *Operculated.* Mantle edge separate from the back of the neck, leaving the pulmonic cavity open; tentacles contractile; diœcious; operculum distinct.

Fam. 5. *Cyclostomidæ.* Muzzle ringed; tentacles two; operculum spiral.

Sect. I. INOPERCULATED. (*Inoperculata.*)

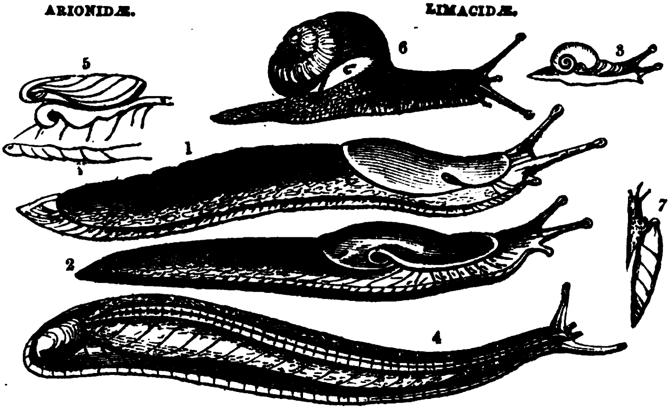
The edge of the mantle adherent to the back of the neck of the animal, forming a closed pulmonary chamber, leaving only a hole for the entrance and exit of the air, which is closed by an external valve on the side of the cavity.

They are all destitute of any operculum, but close the shell, during the torpidity of the animal, with a lid or epiphragm formed of its inspissated humours, and sometimes hardened with a little calcareous matter.

They are all hermaphrodite, but require mutual impregnation, and feed on vegetables; but some few have carnivorous propensities, and others, when they live near man, acquire bad habits, and eat paper and dead animal matter.

They may be divided into two groups, by the form of their tentacles, which conform to their more or less aquatic habits.

A. The terrestrial animals have cylindrical retractile tentacles, the upper pair the longest, having the eyes at the tip; the lower pair smaller, sometimes wanting. They are truly terrestrial, and are divided into two families.



1. Arion ater.
2. Limax antiquorum.
3. Vitrina pellucida.
4. 5. Testacella haliotoidea.
6. Helix Cantiana.
7. Clausilia bidens.

Fam. I. ARIONIDÆ.

Head and tentacles retractile* into the skin, which covers them as a sheath, being drawn into the cavity of the body; the end of their tail is as it were truncated, and furnished with a gland on its upper edge; the respiratory cavity is in the front of the body, with the hole in the front of the mantle's edge; and the orifice of the generative organs is placed on the right side, near, or immediately under, the respiratory aperture. (p. 103. f. 1.) The shell is presented in very different degrees of development in the different genera,—it is very rudimentary in the only English one.

6. 1. Arion *Férus.* (Land Soles.)

Body elongate, lanceolate, united its whole length to the foot; mantle shield-like, anteriorly ovate, granular; the orifice of the generative organs is immediately under the respiratory aperture. Shell distinct, oblong, sometimes only spongy, or only a few granules in the subtance of the mantle.

* *Shell none, or hemispherical and spongy.*

9. 1. Arion *ater.* Black Arion. Tentacles black; the

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* Ehrenberg proposes to call the tentacles of snails *tentacula*, and those of pond snails, which do not bear eyes, *vibracula*.

side of the foot marked with transverse black lines; body with interrupted longitudinal grooves; shield minutely granular; shell spongy, hemispherical.

Limax ater. *Linn. Faun. Suec.* 507.; *Müller, Verm.* 2.; *Drap.* 122. t. 9. f. 3—6.; *Sturm, Faun.*; *Nunneley, Trans. Phil. Soc. Leeds,* 46 t. 1. f. 1. t. 2. f. 1. t. 3. f. 1. 3—6. t. 4, & 5. f. 1.

Limax rufus. *Linn. F. Suec.* 507. *Razoum.—Drap.* 123. t. 9. f. 6.; *Sturm, Fauna,* t.

Limax succineus. *Müller, Verm.* 7. 203.

——— luteus. *Razoum.*

——— marginellus. *Schrank.*

Arion empiricorum. *Férus. Hist. Moll.* 60. 17. t. 1, 2, 3.; *Alder, Mag. Zool. and Bot.* ii. 105.

Inhab. damp woods and hedges.

They vary greatly in colour, from black to brownish rufous, yellow, and yellowish white; the keel is sometimes greenish; the edge of the foot is generally the same colour as the back; but in some of the dark varieties it is scarlet or yellowish: it is always lined with black. Some naturalists have considered these varieties as species; hence the number of synonyma.

Mr. Nunneley believes that the variation of colour is "occasioned by habitation and food, as in fields it is nearly always of a deep black, while in gardens, where the food is more various, it is found of various colours." This does not agree with my experience, for I have found them of very various colours in woods, and under exactly similar circumstances, and at the same period.

The calcareous particles, particularly of the red variety, sometimes form an irregular sub-hemispherical spongy shell. We have specimens in the British Museum, from Bath, presented by S. P. Pratt, Esq.

It has a great geographical range, being found equally in Ireland and Norway, and Italy and Spain. They deposit their bluish eggs in a cluster in May, at the roots of plants.

They feed on dead and living vegetables, and sometimes, according to Mr. Power (*Linn. Trans.* ix. 323.), on dead earth-worms.

The country people consider the appearance of this slug as an indication of approaching rain; but this is rather to be accounted for by the moisture of the ground and of the plants. It is seldom, indeed, to be observed abroad during dry weather, for this would deprive the body of the moisture which is requisite for its existence. (*Bingley.*)

The inferior œsophageal ganglion, according to the excellent observations of Mr. Nunneley, is "of a square form; and being slightly fissured, both transversely and longitudinally, it apparently consists of four ganglia united together: it also consists of two laminæ."

Lister (*Anat.* t. 5. f. 1, 2, 3.), Swammerdam (*Bib Nat.* 1. 162. t. 4.), Cuvier (*Annals Mus. Paris*, vii., and *Mém. Mollus.*), and more lately Mr. Nunneley (*Trans. Phil. and Lit. Soc. Leeds*, i. 41.), have published the anatomy of this animal.

Dr. George Johnston has indicated a species under the name of *Arion subflavus*, in his list of Berwickshire Mollusca, which he says inhabits woods and shady places in that county. I cannot find any species described under this name. Draparnaud describes a *Limax subfuscus*, which Férussac refers to this genus, and he and Deshayes think it may prove to be a variety of *A. ater;* Nilson thinks it is a variety of *A. hortensis.*

* * *Shell distinct, oval, concave.*

10. 2. ARION *hortensis.* Garden Arion. (t. 1. f. 16.) Black; with grey longitudinal streaks; edge of the foot orange; shell oval, concave.

Arion hortensis. *Férus. Hist. Moll.* 6. 5. t. 11. f. 4—6. viii. *a.* f. 2, 3, 4., *Tabl. Syst.* 18.; *Gray, Med. Rep.* 1821.

Limacella concava. *Brard, Hist.* 121. (Shell.)

Limacellus variegatus. *Turton, Man.* ed. 1. 25. t. 3. f. 16. (Shell.)

Limax subfuscus. *Pfeiffer, Syst. Ind.* 4. 20. (?)

—— hortensis. *Blainv.* — *Gratel. Moll. Dax.* 55. f. 4.; *Michelen,* 6.

Var. 2. Grey, with a black streak on each side.

Limax fasciatus. *Nilson, Faun. Suec.* 3.

Arion circumscriptus. *Johnst. Edinb. Phil. Journ.* 1828. v. 77.

Arion hortensis, var. β. *Alder, Mag. Zool. and Bot.* iii. 105.

Inhab. woods, hedges, and gardens.

The variety is greyish, spotted with black, and with a black fascia round the shield and body; the respiratory hole is anterior. The young is yellow or white, with black head and tentacles.

This animal was first noticed as English by Dr. Leach, who determined the species, and placed several named specimens, from Cobham and other parts near London, in the British Museum collection in 1817.

I first indicated this species as being a native, in 1821, and Dr. Johnston, in 1828, and Mr. Alder, more lately, have informed me that the variety is not uncommon in the north of England. It is equally common in my garden at Blackheath, found in company with *Limax agrestis.*

Dr. Johnston more recently, in his list of Berwickshire Mollusca, stated that he believes his *A. circumscriptus* is merely a variety or immature state of *A. ater.* He thought that it was probably the *Limax agrestis* of Dr. Latham (*Linn. Trans.* iv. 85. t. 8. f. 1—4.), or the *Limax marginatus* of Müller. It may be the young state of *A. ater*, for I do not recollect ever to have seen any small specimens which agreed with that species.

Fam. 2. HELICIDÆ.

Head and tentacles retractile, like the former, but the end of the tail is tapering, and destitute of any gland. The pulmonary cavity is generally in the front of the body; the respiratory hole is on the hinder part of its edge; and the orifice of the generative organs is placed near the hinder outer base of the right tentacle.

This family contains more than half of the British land and fresh-water shells, that is, 72 out of 128 species. It has been divided into several genera, and there are many more exotic ones. They have been distributed into sections in the following manner.

I. Body elongate, attached by its whole length to the foot; mantle shield-like.

* *Mantle shield-like, simple, entirely enclosing the shell.* (Limacina.)

1. *Limax.* (p. 103. f. 2.)

* * *Mantle shield-like, with a partly external, thin, central, spiral shell.* (Vitrinina.)

2. *Vitrina.* (p. 103. f. 3.)

II. Body spiral; mantle thin with a thickened edge, lining the inside of an external shell.

* *Body with two longitudinal grooves; lips cylindrical, retractile.* (Testacellina.)

3. *Testacella.* Shell ear-shaped, on the hinder part of the body. (p. 103. f. 4, 5.)

* * *Body granular, without any grooves; lips short, compressed.* (Helicina.)

4. *Helix.* Shell subglobose or depressed; mouth semilunar; peristome rather thickened and reflected. (p. 103. f. 6.)

5. *Zonites.* Shell depressed; mouth semilunar; peristome thin, acute.

6. *Succinia.* Shell oblong, elongate; mouth very large, oblong; peristome thin.

7. *Bulimus.* Shell oblong, elongate, striated; mouth moderate, ovate, toothless.

8. *Zua.* Shell oblong, elongate, polished; mouth moderate, ovate, with a thickened internal edge.

9. *Azeca.* Shell oblong, elongate; mouth moderate, toothed, with a thickened internal edge.

10. *Achatina.* Shell turreted, elongate; mouth ovate; inner lip truncated in front; peristome thin.

11. *Pupa.* Shell cylindrical, blunt; mouth sinuous; peristome reflected.

12. *Vertigo.* Shell cylindrical, blunt; mouth toothed; peristome thickened behind.

13. *Balea.* Shell fusiform, elongate; mouth ovate, clausium none.

14. *Clausilia.* Shell fusiform, elongate; mouth toothed, with an elastic clausium. (p. 103. f. 7.)

I. Body elongate, attached to the whole length of the foot; mantle shield-like, with a small internal or sub-internal shell.

A. *Mantle simply shield-shaped, entirely enclosing the internal shell.* (Limacina.)

7. 1. LIMAX *Fér.* (Slug.)

Body elongate, lanceolate, granular, keeled behind; mantle shield-like, ovate, concentrically lined; shell sub-quadrate, flat, nail-like.

These animals have very much the external appearance of *Arion*, but they are destitute of the gland on the end of the tail; their mantle is marked with circular striæ instead of being granulated, and they have a different nervous system; for, according to Mr. Nunneley, the infra-œsophageal ganglion is like that of Arion, but the underside, instead "of having one transverse fissure, has two; so that it presents, on each side of the medial line, three gangliform eminences instead of two only."

They have generally been united with the *Arions*; but it has lately been discovered that there are animals with well-developed shells that agree with the Arions in character, as the Helices do with the Slugs; and it has therefore been thought better to separate them by the above character into two groups, rather than follow Lamarck in dividing these animals into groups, by the gradually and greatly varying form of the body.

The shells are covered with a distinct periostraca. It has generally been believed that shells which are covered with a reflexed portion or imbedded in the mantle, are destitute of this covering; and they have been separated from other shells for this reason. But this is an error arising from the theory that the *periostraca* of shells is analogous to the scarf-skin of vertebrated animals, instead of its being merely the part, consisting almost entirely of animal matter, that is first deposited by the animal when it is about to enlarge its shell, and which forms the basis of the new part of the shell, afterwards strengthened and thickened by the addition of the chalky matter within it.

These animals sometimes suspend themselves by a kind of thread formed from the viscid secretion which covers their body; hence one of the smaller ones has been called *Limax filans.*

Swammerdam (*Bib. Nat.* i. 158. t. 8.) gives some details of the anatomy of one of the species, but recently Mr. Nunneley, in the *Leeds Transactions*, has given an excellent paper on the comparative anatomy of three of the species, and has shown that there exists a considerable difference in internal organisation between them and the *Arion ater.*

I have great pleasure in referring the reader to this paper for the details, and cannot help expressing a hope that other persons residing in the country will be induced to follow Mr. Nunneley's excellent example, and give to the world similar papers on the animals in their neighbourhood.

* *Mantle produced behind; shell flat.*

11. 1. LIMAX *maximus.* Spotted Slug. Animal ash, variously spotted, with a long white acute keel; he tentacles vinous coloured, and the hinder part of the mantle produced, buckler-shaped. Shell thin, flat, oblong, a little concave, with a membranaceous edge. (t. 3. f. 14.)

Limax maximus. *Linn. S. N.* 108.

—— maculatus. *Leach, MSS. Brit. Mus.*; *Nunneley, Trans. Phil. Soc. Leeds,* i. 46. t. 1. f. 2., and *Anat.*

Limax cinereus. *Müller, H. V.* 5.; *Drap.* 124. t. 7. f. 10.; *Sturm, Fauna,* t. 5.

Limax ater. *Razoum.*

—— fasciatus. *Razoum.*

—— cinereo-niger. *Nilson,* 7.; *Sturm, Fauna,* t. 6.

Limax antiquorum. *Férus. Hist.* 68. t. 4. t. 8. a. f. 1. t. 4. f. 4. (Shell.)

Cochlea nuda, s. domestica. *Swam. B. Nat.* i. 158. t. 8.; *Lister, Ang.* t. 1. f. 151.

Limacella Parma. *Brard,* 110. t. 4. f. 1, 2. 9, 10. Shell.

Limacellus Parma. *Turton, Man.* ed. 1. t. 3. f. 14. (Shell); —*Lister, Ang.* t. 1. f. 15.

Inhab. cellars.

The skin has small rugosities placed in lines converging towards the tail. The foot is divided into three nearly equal bands.

The animal is very variable in its colour. 1. Reddish brown, with four longitudinal, black, interrupted stripes, and the shield black-spotted. 2. Brown, black-spotted, back with three yellow, and two black lines. 3. Brown, with rather darker streaks. 4. Brown, black-spotted. 5. Ash, with a black shield; and 6. Black with a white keel: the latter is *L. cinereoniger* of Nilson.

Shell about six lines long and four broad, thin, semi-transparent, yellowish-white, concave on the inside, which is sometimes sprinkled with minute crystal-like shining particles, a little convex and transversely wrinkled on the outside; with the edges membranaceous; on the top, or broader extremity, is a small central prominence, or apophysis of adhesion, by which it is attached to the animal; the lower extremity very thin and rounded.

When irritated, they dilate their shields. Their eggs are white, and deposited in spring under stones, &c.

These animals (especially the larger slug) are often infested with mites, which were discovered by Réaumur, in the *Mém. Acad. des Sciences*, 1710, and called by Gmelin *Acarus Limacum.* They have been well described, with some interesting details of their habits, by Mr. Jenyns, under the name of *Philodromus Limacum*, in the *Mag. Nat. Hist.* iv. 538. f. 109.

* * *Mantle short and rounded behind; shell flat.*

12. 2. LIMAX *flavus.* Yellow Slug. Yellowish, tessellated with brown; tentacles bluish; the hinder part of the mantle rounded; shell thin, concave, mammillated externally at its posterior extremity. (t. 5. f. 16.)

Limax flavus. *Linn. Fauna Suec.* 363.
——— variegatus. *Drap. Hist. Moll.* 127.; *Fér. Prod.* 21., *Hist.* 71. t. 5. f. 1—6.; *Nunneley*, l. c. 47. t. 1. f. 3.; *Leach, Brit. Mus.*
Yellow Slug. *Penn. Brit. Zool.* iv. 41., from *Lister.*
Limax succino colore. *List. Conch.* t. 101. f. 6.
Limacella concava. *Brard*, 121. t. 4. f. 5, 6. 13, 14, 15. (Shell.)

Limacellus variegatus. *Turton, Man.* ed. 1. t. 3. f. 16. (Shell.)

Inhab. cellars and damp places in and near London, Plymouth, and Oxford.

In spirits, it is dark olive, mantle and back yellow-spotted, sides rather paler; the number and size of the yellow spots vary in the different specimens; the young have sometimes a yellowish dorsal streak; the end of the tail only is keeled, by which it is known from *Limax maximus;* and the central band of the foot is generally rather narrower than the side ones. The shell is very like that of *Limax maximus*, but it is smaller, and the front edge is generally more rounded.

Lister did not mark this species as English, but this was probably an oversight of the engraver.

When touched, it becomes covered with a white mucus. It has the power of forming a thread, by which it suspends itself from trees, &c. This fact was first noticed by Lister (*Anim. Ang.* iii.), and since by Dr. Latham and others (*Linn. Trans.* i. 182. and iv. 85.).

* * * *Mantle short, truncated behind; shell oval, thick, convex beneath.*

13. 3. Limax *carinatus.* Keeled Slug. Yellowish, tessellated with brown; head and tentacles black; mantle granulous and with a furrow near its margin; the ridge or keel of the back very obvious, and of an amber colour; the sides pale; shell oval, often thickened, and very convex beneath. (t. 3. f. 15.)

Limax Sowerbii. *Férussac, Hist. Moll.* t. 8. D. f. 7, 8.; *Denson, Loudon's Mag. N. Hist.* vi. 694. f. 120. *a. b.; Alder, M. Z. & B.* ii. 105.

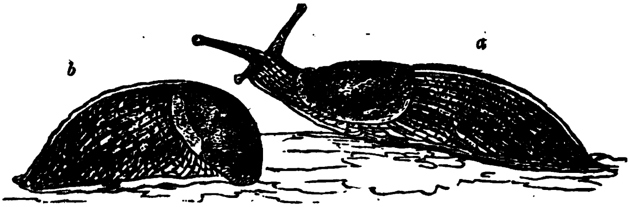
Limax carinatus. *Leach, Moll.* 73. t. 8. f. 1.; *Turton, Man.* ed. 1. n. 15.; *Alder, M. Z. & B.* ii. 105.

Limacella unguicula. *Brard,* 116. t. 4. f. 3, 4. 11, 12. (Shell.)

Limacellus unguiculus. *Turton, Man.* ed. 1. t. 3. f. 15.

Inhab. gardens near London and Chelsea.

The central band of the foot is broader than the side ones, and the keel, which is very prominent, extends the whole length of the back. (See fig. *a. b.* from Mr. Denson's paper.)



The eggs are oval, soft, elastic, nearly $\frac{2}{10}$ of an inch long, as transparent as ground glass, but of a yellowish hue; the two coats of the egg are clouded with very minute white freckles, producing the appearance of ground glass.

This species was first noticed by Dr. Leach, who received it from Chelsea, and named and put it in the British Museum collection in 1817.

Mr. Alder considered *L. carinatus* and *L. Sowerbii* two different species instead of synonyma of the same.

They sometimes, like many of their congeners, feed on animal food, and even devour the dead remains of each other, leaving only the skin of the back; and they will also sometimes attack sickly individuals of their own species.

14. 4. LIMAX *agrestis* Linn. Milky Slug. Reddish or grey, often spotted with brown; body furrowed with interrupted lines, with a short oblique keel; the mantle large, ovate, with circular lines, rounded behind; shell small, very thick and hard, variously formed, and rarely concave. (t. 3. f. 17.)

Limax agrestis. *Linn. S. N.; Nunneley*, l. c. t. 1. f. 4.

Limax filans. *Hoy, Linn. Trans.; List. Ang.* t. 3. f. 16.

Limacella obliqua. *Brard*, 148. t. 4. f. 7, 8. 17, 18. (Shell.)

Limacellus obliquus. *Turt. Man.* ed. 1. t. 3. f. 17.

Inhab. fields.

Varies greatly in size and colour, from white to pale reddish, and from grey to blackish, but is easily distinguished by its short keel, which is always placed obliquely. When irritated, it pours out a milky white mucus, which leaves a white streak when it is dry.

* * * * (?)

15. 5. LIMAX *brunneus*. Brown Slug. Blackish brown, rather rugose, longitudinally ridged; mantle paler, yellow behind, marked with fine transverse-ridges; tentacles short; neck longer than the shield.

Limax brunneus. *Drap. Tabl.* 104., *Hist.* 128.;

Fér. Tab. 23.; *Johnst. Rep. Berw. Nat. Hist. Club.*

Inhab. shady woods, and is comparatively rare in Berwickshire.

Dr. Johnston observes, that this differs from every variety of *Limax agrestis* in its darker colour, its colourless mucus, in the abrupt termination of the tail, in the position of the shield, which is nearly central when the animal is fully extended, and in the size of the shield, which is as long as the posterior half of the body; nor is there any keel on this part.

Dr. Johnston adds, that, as a native, its discovery is due to his friend Mr. J. Alder of Newcastle, who pointed out its peculiar character to him in specimens taken in Dunglass Dean; and Mr. Alder thought it was the *Limax brunneus* of Draparnaud.

Draparnaud discovered his specimen near Montpellier, and Férussac arranges it with those species of which he is desirous of receiving further information: indeed, he appears to doubt to which genus it ought to be referred.

B. *Mantle shield-shaped, with a partly external, thin, central, spiral shell.* (Vitrinina.)

8. 2. VITRINA. (Bubble Shell.)

Animal—Body rather elongate, lanceolate; mantle subanterior, produced into a rugose shield in front, with a central spiral prominence, protected by a thin, transparent, rather depressed, subglobular shell, which is partly covered by the back edge of the shield, and a tongue-like process of the mantle on the right side. Shell imperforated; spire depressed, of only a few whorles; mouth large, rounded, lunate; peristome thin.

This genus is intermediate in form between a slug and a snail, having the shield-like mantle of the one, and the globular external shell of the other genus. The shells are very like the *Zonites* in their appearance, but have a much smaller and more depressed spire, more rapidly enlarging whorles, and a much larger mouth; but they are best known by their axis being imperforated.

Nilson observes, that many zoologists, especially the French ones, contend that the animal cannot withdraw itself into its shell: he has observed this species not only withdraw itself entirely, but so much so as to leave a space behind it like the snails. (*Moll. Suec.* ii.)

Nilson kept some specimens, which he had caught at the end of January, in a bell glass, and on the 19th of February he observed some eggs placed among the putrescent leaves. The eggs were oval, globose, white, subpellucid, with a central opake spot, and placed in little tufts, consisting of eight or nine eggs. In the beginning of March the opake spot was not increased in size, but showed signs of slow movement, and on the 21st or 22d of March the animals were excluded. He thought, when he observed them with the microscope, that the animal bored its way through the egg-shell, forming a hole out of which first the head, and then the foot, was produced. When first hatched, both the animal and shell were perfectly formed, but the eyes were retracted into the body; they are afterwards protruded.

16. 1. VITRINA *pellucida*. Transparent Glass Bubble.
3 (t. ~~4~~. f. 21.) Shell green, depressed, hyaline and glossy; whorles three, aperture somewhat oval.

Helix pellucida. *Müller, Verm.* 16.; *Penn, B. Z.* iv. 134 (?)
Helix Draparnaudi. *Cuv.*
—— fuscescens. *Gmelin.* 3639.
—— diaphana. *Poiret.*
—— nitida jun. *Montagu, MSS.*
—— limacoides. *Alten.*
—— elliptica. *Brown, Wern. Trans.* ii. 523. t. 24. f. 8. (1819).
Vitrina pellucida. *Drap.* 119. t. 8. f. 34—37.; *Fleming, Phil. Zool.* ii. t. 4. f. 1.; *Alder, Trans. Newcastle — Mag. Z. & B.* ii. 105.
Vitrina Mülleri. *Jeffreys, Linn. Trans.* xv. 326.
—— Draparnaudi. *Leach, Moll.* — *Jeffreys, L. T.* xvi. 326.
Helicolimax pellucidus. *Férus. Hist. Moll.* t. 9. f. 6.
Vitrinus pellucidus. *Montf.* ii. 239.
Vitrina diaphana.
—— depressa. } *Jeffreys, L. T.* xvi. 326.
—— Dillwynii.
—— elongata. *Jeffreys, L. T.; Turton, Man.* ed. 1., not *Drap.*
Vitrina beryllina. *Pfeiffer,* 47. t. 3. f. 1.
Cobresia helicoides vitrea. *Studer.*
Hyalina pellucida. *Studer.*

In woods, among decayed leaves, and under stones. Animal light-coloured above, with black head and horns; under part light-coloured, bordered with black;

airvalve, when closed, with a black spot, when open, surrounded by a black ring. (*Sturm, Fauna*, t. 9.; *Pfeiffer*, l. c.)

Shell half an inch in diameter, not so much in height, extremely thin and transparent, of a pale watery green, and quite smooth; volutions three, the first very large and a little oblique, the others but little raised and ending obtusely; aperture very large, oval-elliptic, rather oblique, interrupted at top by the prominency of the second volution, with the margin thin and membranaceous, often coloured with a pale brown border, without internal rib; the suture well marked, and when magnified, exhibiting a striated spiral line; pillar lip a little reflected, and forming a slight concavity, but not an umbilicus.

1. Shell varies as to the colour of its suture; in some this is whitish and more wrinkled than in others; in some it is brown; whilst in others, the brown, in particular lights, appears as if gilded.

2. The green colour of the shell also varies in hue.

Mr. Jeffreys has described three British species of the genus, but Mr. Alder observes, that "Mr. Jeffreys having kindly favoured me with specimens of his *V. Draparnaudi*, I compared them carefully with specimens of *Helicolimax Audebardii* Fér., collected on the Continent, and have come to the conclusion that they are not of that species. I am afraid that *V. Draparnaudi* can only be classed as a variety of *V. pellucida* (*Helicolimax pellucidus* Fér.). Mr. Jeffreys now considers his *V. diaphana* to be only a variety of the same. *V. Dillwynii* appears to be something different; but being founded on a single dead specimen, it is to be hoped Mr. Jeffreys may be able to obtain additional specimens, and in a living state, in order fully to establish it."

Mr. Alder having communicated to me the specimens referred to above, after careful examination, I have come to the same conclusion: indeed, *V. Draparnaudi* appears to be hardly a variety; and a specimen which Mr. Alder thinks is like *V. Dillwynii* of Mr. Jeffreys, appears chiefly to differ in the altered appearance and character which two shells of different degrees of opacity assume, when compared together.

Dr. Turton appears to have inserted *Vitrina elongata* of Draparnaud, on Mr. Jeffreys' authority. Mr. Alder observes that no such shell is now found in Dr. Turton's cabinet.

Dr. Fleming first observed this species in Britain; for he says that he sent it to the late Mr. Montagu in 1809, who considered it as the fry of the *Helix nitida*. Brown described it as British in 1819, and it was noticed as English by M. Férussac and myself in 1820 and 1821.

Captain Brown, in his *British Shells*, figures two shells, one of which he calls *Vitrina membranacea*, t. 40. f. 3, 4, 5., and the other *Vitrina margaritacea*, t. 40. f. 54, 55, 56., which I have not been able to see. The latter is more like a *Zonites* than a *Vitrina*.

The animal is very hardy; for, according to Nilson, it is found crawling about amongst leaves in the southern part of Sweden in the depth of the winter; and it is also found in the most northern part of that country.

II. Body elongate; mantle thin, with a thickened edge, only lining the inside of an external shell, which it forms or rather moulds on its surface.

C. *Body with two longitudinal grooves, from the front of the mantle to the head; lips subcylindrical, retractile.* (Testacellina.)

3. TESTACELLA *Cuv.* (Testacelle.)

Body elongate, tapering in front, with two diverging grooves from the front of the mantle, extending to the head; mantle small, covered with an ear-shaped shell, with a very short spire, which is placed on the hinder part of the body. The mouth of the shell is very large, the outer lip thin, with a slight notch at the hinder end.

Faure Biguet, who first discovered the animal, called it *Testacellus;* Draparnaud and Cuvier have changed the name to *Testacella.*

The animals, according to the observations of M. Férussac, have a peculiar mantle (or rather appendage of the mantle), which is simply gelatinous, contractile, and habitually hidden under the shell, divided into several lobes, and susceptible of an extraordinary development, so as to envelope the whole of the contracted body of the animal, and thus protect it from extreme drought.

The animals live for the greater part of their life in holes under ground, only coming to the surface to change their locality; and they remain buried during the cold or very dry weather. It is this power of protecting themselves from the effect of sudden changes of temperature, there is little doubt, that has allowed them to adapt themselves with such facility to our climate.

They deposit their eggs under ground; these are oblong, large, and covered with a thick elastic coat, and burst when put into a warm place.

17. 1. **Testacellus** *haliotideus.* Ear-shaped Testacelle. (t. 3. fig. 19, 20.) Shell roundish-oval, with the outer lip dilated, and the pillar flat and broad, and scarcely reflected outwardly.

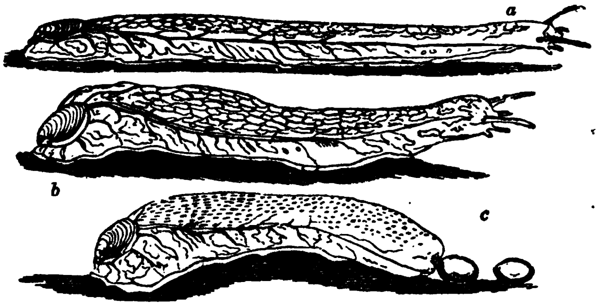
Testacellus haliotideus. *Férussac, Hist.* t. 8. f. 5. 9.; *Sowerby, Gen.* f. 1, 2.
Testacella haliotidea. *Drap.* t. 8. fig. 44, 45.
——— scutulum. *Sow. Gen.* f. 3. 3.
——— europæa. *Roissy. Buff.* v. 252.
——— Galliæ. *Oken.*

Inhab. France; naturalised in gardens.

Animal yellowish, reddish, or grey, sometimes spotted on the sides beneath; tentacles cylindrical.

The shell is broad in proportion to its length, and the pillar, near the upper end, is broad and nearly flat.

This animal is common in the island of Guernsey, where it was first observed in the garden of Mr. Lukis, in 1801. The late Mr. Sowerby afterwards found it in a garden at Lambeth. When the animal



deposits its eggs, the head and tentacles are drawn in. See fig. *a. b. c.*, from *Mag. Nat. Hist.* vii. 226. f. 39., exhibiting the animal in its different positions.

In winter, they bury themselves from one to two feet deep in the earth, and are most above the surface from August to November. They chiefly live on worms, and sometimes will attack slugs and smaller specimens of their own species; shells of their own kind being sometimes found in their stomach.

The *Testacella scutulum* of Sowerby is a very slight variety of the common species.

D. *Mantle thin, enclosed in the shell; body granular, without any grooves; lips short, rounded.* (Helicina.)

4. Helix. (Snail.)

The animal moderate, with an elongate depressed foot, and a large, produced, central, spiral body, covered with a subglobose or depressed shell, with a lunate mouth, which is generally broader than long, strengthened with an internal thickened rib, and more or less reflexed edges: tentacles four, the two lower small, club-shaped.

These animals have a distinct and very variously divided *vesicula multifida*, which is wanting in *Succinea*, *Bulimus*, and other allied genera.

The young shells have the outer whorles generally more or less keeled, and the axis is always umbilicated or perforated, but the perforation is sometimes masked by the reflexion of the outer lip of the adult shell over it.

This genus is known from *Zonites* by the thickening of the outer lip; from *Vitrina* by the axis being perforated, from *Succinea* and *Bulimus* by the axis being depressed (and not elongate), making the shell subglobose or depressed.

The animals, at the approach of winter, or in very dry weather in summer, recede into their shell, and secrete a quantity of mucus, which being moulded, as it were, on the retracted part of the mantle which encloses the folded-up foot, forms when it dries by exposure, a cover to the aperture, which is usually membranaceous, with a triangular perforation over the respiratory hole of the mantle.

In some species, as *Helix Pomatia*, the membrane becomes strengthened with a quantity of calcareous matter, which is first deposited on the triangular spot before referred to. In this case, the animal forms several membranaceous coverings, a little distance from one another, within the outer, hard, calcareous, one; similar to the membranaceous covering of other Helices. On the approach of warm or damp weather, the animal softens the adhesion that has taken place between the lid and the edge of the mouth of its shell, by emitting a small quantity of fluid mucus; and the cover is thus easily thrown off by the pressure of the foot. When another is required by external circumstances, the process is commenced afresh. This lid gives the name *Pomatia* to our largest snail. Lister called the lid the *operculum saliva confectum;* Müller calls it the *operculum hybernum*, or winter lid; and more recently it has been named by Draparnaud the *epiphragm;* the latter name has been generally adopted. Montagu has been blamed for calling it an *hybernaculum*, but this arises from a mistake. Montagu intended by the latter name the hole in which the animal buries itself, as is proved by his use of the term, at p. 407.

The power of forming this kind of epiphragm, and the thickening of the outer lip, has been considered a peculiar character of the land Mollusca, but it is now known that pond snails (*Limnæus* and *Planorbis*), when left dry by the evaporation of the water in which they have been living, thicken the edge of the lip, and form a distinct epiphragm.

Though the British species are not very numerous, it has been thought advisable to divide them into several sections, to facilitate their determination, and also to show the natural groups into which the numerous exotic species naturally fall.

a. TAPADA.

Shell subglobose, thin, covered with a green periostraca; axis solid, twisted; mouth large, toothless; peristome only slightly thickened; epiphragm calcareous, convex.

18. 1. HELIX *aperta.* The Tapada Snail. Shell subglobose, ventricose, very thin, brownish-green, rather wrinkled; mouth large.

Helix aperta. *Born, Mus.* t. 15. f. 19, 20.; *Dillw. R. S.* ii. 946.

Helix neritoides. *Chemn. Conch.* ix. t. 133. f. 120. 4. 120. 5.

Helix naticoides. *Drap. Moll.* t. 5. f. 26, 27.; *Férus. Hist.* t. 11. f. 17. to 21.

Pomatia *Dioscorides.*

Inhab. hedges, among nettles, in Guernsey.

Mr. Edward Forbes, on whose authority this species has been added to our Fauna, discovered a single crushed specimen in mud under the side of a hedge in Guernsey, in such situations as he had observed the animal in Provence; he presented the specimen to the British Museum. It is common in the islands and on the shores of the Mediterranean, and is eaten in Provence, where it is regarded as the most delicate kind of snail.

b. ACAVUS *Montf.* (Tachea *Leach.*)

Shell subglobose banded; peristome rather thickened, reflexed, with an internal rib; axis perforated, perforation covered in the adult specimens; epiphragm membranaceous.

19. 2. HELIX *aspersa.* Common Snail. (t. ~~3~~4. f. 35.) Shell somewhat globular, with the surface wrinkled, yellowish-brown or olive, with four brown bands; whorls four; mouth roundish lunate; the peristome white and reflected.

Helix aspersa. *Müller, Verm.* ii. 59.; *Montagu,* p. 407.; *Drap.* p. 89. tab. 5. f. 23.; *Brard,* p. 7. tab. 1. f. 1.; *Turton, Man.* 52. f. 35.; *Leach, Mollusc.* p. 82.; *Jeffreys, Linn. Trans.* xvi. 328.

Helix hortensis. *Penn. Zool.* iv. 136. t. 84. f. 129.; *Donovan,* t. 131.; *Turt. Dict.* p. 60.

Helix grisea. *Dillwyn,* p. 943.

——— lucorum. *Pulteney.*

Cochlea vulgaris. *Da Costa,* p. 72. t. 4. f. 1.

Inhab. gardens, old walls, &c. Common.

Animal warty, yellowish grey, with a paler dorsal streak. (*Rossm. Icon.* t. 4. f. 75.)

Shell an inch and a half in diameter, covered with a creased or coarsely wrinkled skin, somewhat globular, with the mouth a little longer than wide, the edge of which is slightly reflected; of a dull olive colour, with generally four interrupted brown bands, one and rarely two of them penetrating the mouth. It varies much in colours and markings, but is readily known by its wrinkled coat.

1. It varies in colour.—Sometimes they are pale yellowish, without bands, but generally banded, sometimes the bands are all separate, but generally the second and third bands are united into one; sometimes all the bands are united together, which makes the shell appear darker, and marked with transverse pale lines.

2. It varies greatly in size according to the quantity of food, and the temperature of the place in which it lives.

Monstrosities sometimes occur: —

1. Reversed, or with the whorls turned in a contrary direction.

2. With the spire elongated, and conical when the whorls are rounded.

3. With the whorls produced, and separated from one another*: the latter has been called—

Cornucopia *Born, Mus.* 262.
Serpula Cornucopia *Gmelin.*
Serpula helicina *Solander.*
Cornucopia helicina *Shaw, Nat. Misc.* xiv. 568.
Cornucopia monstrosa *Chemn.*

The internal spicula or darts, which this species ejects in the spring of the year, are about a quarter of an inch long, slender, and tapering to a fine point, exactly square, with four sharp angles, rounded and hollow at the top like the socket of a joint. A magnified figure may be seen in Lister's anatomical tables at the end of his Conchology, t. 2, 3. f. 1, 2.

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* A figure of this monstrosity ornaments the covers of this work.

The snail which inhabits this shell seems to be more influenced by the weather than many of the smaller sort; for upon the first appearance of cold they creep into crevices and under stones, clustering together and clinging to each other, as if they were capable of communicating warmth by association. They are the pest of gardens, especially such as are inclosed by hedges and old walls. Upon many of them are found a series of thin circular layers placed horizontally; these are the laminar foliations of the winter epiphragm left by another of the species which had been attached to it.

This snail is collected and sold in Covent Garden and other markets, as a cure for diseases of the chest, boiled in milk; and quantities of them are collected and packed in old casks, and sent to the United States of America, as delicacies. In this manner they travel very well, as they fix themselves on one another round the circumference of the cask, leaving a vacant space in the centre.

The glassmen at Newcastle once a year have a snail feast; they generally collect the snails themselves in the fields and hedges, the Sunday before the feast day.

20. 3. HELIX *hortensis*. Garden Snail. (t. 3. f. 24.) Shell somewhat globular, thin, smooth, yellow or brown, uniform or banded; mouth roundish lunate, depressed, with the peristome white.

Helix hortensis. *Lister*, *Conch.* t. 3. f. 3.; *Linn.* (?); *Müller*, *Verm.* ii. 52.; *Drap.* p. 95. tab. 6. f. 6.; *Brard*, p. 16. tab. 1. f. 3.; *Montagu*, p. 412.; *Jeffreys*, *Linn. Trans.* xvi. 330.; *Alder*, *M. Z. & B.* ii. 106.

Tachea hortensis. *Leach*, *Mollusc.* p. 85; *Turton*, *Man.* 34. f. 24.

Cochlea fasciata. *Da Costa*, p. 76. t. 5. f. 4, 5.

Helix nemoralis Var. *Linn. Trans.* viii. 206.; *Dillw. Cat.* ii. 942.

Inhab. woods, hedges, and wet shady places.

Animal reddish, yellowish, or pale grey; tentacles generally dark grey. (*Sturm*, t. 22.)

Shell about a fourth part smaller than *H. nemoralis*, which in colour and varieties it much resembles; but is distinguished by its smaller size, in not being quite so convex, in being more polished and thinner, and in the white margin round the aperture.

Like many other snails, it offers the following monstrosities: —

1. In the whorls being reversed. (*Férus.* t. 36. f. 10.)

2. And in the whole of the spires being more or less separated from each other (*Férus. Hist.* t. 36. f. 11, 12.)

In the Annals of Philosophy for 1825, p. 152., I observed that there was a difference in the form of that part of the generative organs of *Helix nemoralis* and *H. hortensis* called *vesicula multifida* by M. Cuvier, in his dissection of *Helix Pomatia;* and further observed that this name for the organ gives an erroneous impression, as in several of the Helices it is simply forked, in others doubly forked, and rarely many-cut, as it is in the edible snail.

21. 3. **Helix** *hybrida.* The Brown-mouthed Snail. Shell somewhat globular, smooth, polished, brown or yellow, brown-banded, with the rib of the lip pale brown, and the edge whitish.

Helix hybrida. *Pioret; "Leach MSS."*
—— hortensis Var. *Férussac, Tabl.* 31.; *Alder, Mag. Z. & B.* ii. 106.

Inhab. woods and hedges with the former.

The animal of this species differs from either *Helix hortensis* or *H. nemoralis,* in the form of the *vesicula multifida,* as well as in the colour of the mouth of the shell. In all its characters it is intermediate between these two species, but yet I do not think there is any reason to believe that it is a mule, or that it unites them into one species. This species does not seem to be so variable in its colour as either of its allies.

Mr. Alder notices this species in his catalogue of Newcastle shells.—"A curious pale brown variety of this species (*H. hortensis*) occurs at Stella, the lips being of a paler shade of the same colour, and rarely white."

M. Deshayes believes this animal to be the mule of the two species, as the name indicates; he says they are not sterile (*Lam. H.* ed. 2. vi. 53.) He had not observed the peculiarity in the *vesicula multifida.*

22. 4. **Helix** *memoralis.* Girdled Snail. (t. ~~X~~ 3. f. 23.) Shell somewhat globular, smooth, yellowish or brown, and mostly 5-banded, with the mouth roundish lunate, compressed; margin of the aperture brown.

Helix nemoralis. *Linn. S. N.* i.; *Montagu,* p. 411.; *Drap.* p. 94. t. 6. f. 3—5.; *Brard,* p. 12.

t. 1. fig. 2 & 4.; *Jeffreys, Linn. Trans.* xvi. 330. *Sheppard, L. T.* 163.

Tachea nemoralis. *Leach, Mollusc.* p. 84.

Cochlea fasciata. *Da Costa*, p. 76. t. 5. f. 1, 2, 3. 8. 19.

Helix cincta, and H. qunquefasciata. *Sheppard, L. T.* 163.

Cochlea versicolor. *Humph. M. C.*

Helix turturum. *Stewart, Elem. N. H.* ii. 413.

Inhab. woods and hedges.

Animal dirty or yellowish grey; head, tentacles, and two streaks from the tentacles, blackish. (*Sturm*, t. 24.)

Shell hardly an inch in diameter, and about three quarters high, glossy, semitransparent, finely striate; spire composed of five rounded volutions; aperture semielliptic, longer than wide, the peristome produced at the pillar in a nearly straight line, where it is flattened and thickened, surrounded by a chocolate or reddish brown border.

The shell varies —

1. Greatly in the intensity of the colour; being sometimes pellucid white, yellow, reddish, or brown.

2. In being plain, or marked with five or fewer bands (some of the bands being deficient).

3. In the bands varying very considerably in breadth; being sometimes narrow, at others broad, when two or more of them are often confluent.

4. The bands are generally black or brown, but sometimes pellucid, and nearly colourless.

5. In size, according to the abundance of food or locality.

Monstrosities, with the whorls much produced, or even detached from one another, or turned in the contrary direction, sometimes occur. (See *Férussac, Hist. Moll.* t. 34. f. 8, 9, t. 32. *a.* f. 2.)

Mr. Sheppard believes that the plain sort (*H. nemoralis* Shepp.), the one-banded (*H. cincta* Shepp.), and the five-banded (*H. fasciata* Shepp.), are distinct kinds, because he says they always breed together! He also observes that the spicula of the one-banded kind is four-sided in the middle, and perfectly straight; in the five-banded it is also four-sided in the middle, but curved, as in *H. aspersa!*

When the shells are lying exposed to the sun without any shelter, their upper surface often becomes of a fine pink or rose-colour.

The eggs are white, ovate. (See *Pfeiffer*, t. 7. f. 3.)

The animals sometimes have a morbid appetite, and eat worms, and even cooked meats. (See *Sow. Zool. Journ.* i. 285.)

On this animal is sometimes found a parasitic insect, which has caused considerable interest among the entomologists, and which has proved to be the larva of *Drilus flavescens.* (See *Mielzinsky, Isis,* xvi. (1825), p. 477.)

Messrs. Brard and Deshayes propose to unite *Helix nemoralis* and *H. hortensis* into one species. M. Deshayes states that he has often seen the two kinds in copulation; that these connections he believes to be fertile, for in the same situation he has found the *Helix hybrida* with its rosy mouth; and more lately M. Deshayes proposes to consider *Helix nemoralis, H. hortensis, H. hybrida, H. sylvatica,* and *H. austriaca,* as all varieties of the same species. (*Hist. Anim. S. Verteb.* viii. 56.)

c. POMATIA *Gesner.*

Shell subglobose, solid, banded; peristome rather thickened, reflexed; axis perforated; epiphragm calcareous, with several membranaceous ones within it.

23. 5. HELIX *Pomatia.* Edible Snail. (t. 4. f. ~~24~~ 8.) 34
Shell nearly globular, solid, striate, pale rufous, with obscure darker bands; aperture roundish lunate; peristome thickened, slightly reflexed.

Helix Pomatia. *Linn. S. N.* i.; *Montagu,* p. 405.; *Drap.* p. 87. t. 5, fig. 20—22.; *Brard,* p. 19. tab. 1. fig. 5.

Cochlea Pomatia. *Da Costa,* p. 67. t. 4. f. 14.

——— edulis. *Humph. M. C.*

Pomatia antiquorum. *Leach, Mollusc.* p. 89.

Inhab. woods and hedges, on chalky soil, and oolite formations, in the southern and midland counties of England.

Animal warty, pale greyish brown, beneath grey; tentacles long, paler; foot dilated, netted with impressed lines, beneath ashy. (*Sturm, F.* t. 21.)

Shell two inches long and as much high, rather solid, with the body volution extremely large and inflated, the others very little rounded, strongly striate across, and minutely so in a spiral direction; colour whitish, with the bands hardly visible, or pale tawny, with usually four darker bands, two of them penetrating the aperture at the pillar; aperture somewhat orbicular, longer than broad, with the margin thick, and reflected at the pillar so as in general to cover the umbilicus or nearly so; the inside of a pale violet brown.

The shell varies greatly: —

1. In size.
2. In the intensity of the bands.
3. In the ventricoseness, and
4. In the height of the spire.

Monstrosities are sometimes found with the spire depressed, when it is *Helix pomana* of Müller; and others with the spire produced and conical, when it is *H. scalaris* of the same author.

5. It is sometimes reversed, and very rarely the whorls are separated one from the other like a cornucopia. (See *Féruss. Hist.* t. 21. f. 7, 8, 9.)

The eggs are globular, covered with a white, opake coriaceous skin, and are about two and a half lines in diameter. They are figured by Pfeiffer (t. 7. f. 2.), who has given a most complete and interesting description of all the changes which the egg undergoes during its hatching, in the first plate of the third part of his work.

Lister (*Tab. Anat.* t. 1.), Harderus (*Basil,* 1676.), Swammerdam (*B. Nat.* t. 4. f. 1. 4.) Gaspard (*Ann. Sci. Nat. & Zool. Journal,* i. 93.), and Cuvier (*Mém. Moll.*), have given accounts of the anatomy of this species of snail.

From the time of the Romans, who fattened them as an article of food, they have been eaten by various European nations, dressed in various ways. Petronius Arbiter twice mentions them as served up at the feast of Trimalchio (Nero), first fried, and again grilled on a silver gridiron.

At one period it seems that they were admitted at our own tables; as Lister, in his *Hist. Anim. Angl.* p. 111., tells us the manner in which they were cooked in his time: "They are boiled in spring-water, and when seasoned with oil, salt, and pepper, make a dainty dish." "Coquuntur ex aquâ fluviatili, et adjectis oleo, sale et pipere, lautum ferculum præparant." And Ben Jonson, in "Every Man in his Humour," mentions this dish as a delicacy.

> "Neither have I
> Dressed snails or mushrooms curiously before him."

These circumstances suppose their long foreknown establishment in this country; and together with their general diffusion in certain soils, incline us to consider them as indigenous, and not introduced by Sir Kenelm Digby for medicinal purposes, nor, according to Da Costa, by Mr. Howard as an article of food. (See p. 35. of the Introduction.)

Dr. Turton observes, "After the animal has been extracted, there remains at the bottom of the shell a glairy transparent matter, which affords one of the best and most durable cements in nature, resisting every degree of heat and moisture."

d. ARIANTA *Leach MSS.*

Shell subglobose, banded; peristome rather thickened; axis perforated; epiphragm membranaceous.

24. 6. HELIX *arbustorum.* Shrub Snail. (t. 3. f. 25.) Shell somewhat globular, rather solid, brown or yellowish, marbled and marked with a single band; mouth roundish lunate; peristome reflexed, white.

Helix arbustorum. *Linn. Syst. Nat.* 1. 1045.; *Montagu,* p. 413.; *Drap.* p. 38. t. 5. f. 18.; *Brard,* p. 65. t. 2. f. 12.; *Pfeiffer,* t. 2. f. 7, 8.

Arianta arbustorum. *Leach, Moll.* p. 86.

Cochlea unifasciata. *Da Costa,* p. 75. t. 17. f. 6.

Inhab. moist woods and river sides, in wet shady places among willows.

Animal granular, greenish black; hinder part of the foot and beneath, grey; tentacles shortish. (*Sturm,* t. 23.; *Rossm.* t. 5. f. 7, 8.)

Shell about three quarters of an inch high, and as much in diameter, but variable in size and proportion, striate, mostly brown marbled with small yellowish spots, or greenish-yellow with whitish spots, with a single blackish band, which winds round the middle of the lowest volution and continues round the base of the rest, not penetrating the aperture: this band is often faint, rarely wanting; aperture semielliptic, longer than wide, more produced at the pillar side, with the margin slightly reflected and white, with a white internal rib.

The young shells have a thin lip, with a slight white internal rib.

It varies — 1. In colour, from dark chestnut to pale yellowish white, with only a few whiter specks.

2. In the thickness of the shell, the thinner specimens being generally destitute of the band.

3. In the presence or absence of the band.

4. In the size, according to the locality. The small mountain variety has been called a species by the Swiss shell dealers.

It is sometimes distorted — 1. by the whorls being reversed; 2. the spire more or less elevated or depressed; 3. very rarely the whorls are elevated and separated from one another. (See *Férus. Hist.* t. 29. f. 1, 2, 3.)

There are some remarks on the anatomy of this snail in the *Zoological Journal*, i. 174.

e. TRIGONOSTOMA *Fitz.*

Shell subdiscoidal, above flat, beneath umbilicated; brown, one-coloured; mouth trigonal, edge more or less toothed; periostraca hispid, with long hairs.

Pl. 11. f. 131.

25. 7. HELIX *obvoluta.* Cheese Snail. (~~f. 91~~.) Shell orbiculate, flat umbilicated, bald, reddish brown; spire rather concave; mouth triangular, edge slightly reflexed, with a small tooth on the inside of the lip; lips reddish white.

Helix obvoluta. *Müller, Verm.* 27.
—— bilabiata. *Oliv. Ad.* 177.
—— trigonophora. *Lam. Journ. N. H.* t. 42. f. 2.
—— holosericea. *Gmel.*, not *Studer; Drap. Moll.* t. 7. f. 27. 29.; *Brard, Moll.* 62. t. 2. f. 16, 17.; *Rossm. Icon.* 69. t. 1. f. 21.; *Férus. Hist.* t. 51. f. 4.

Inhab. among the moss near the roots of trees, in Ditcham Wood, near Brenton, Hants.

Animal shagreened, foot grey, neck blackish; tentacles black, upper long, lower very short. (*Sturm*, t. 17.)

This shell was discovered by Dr. James Lindsay (*Linn. Trans.* xvi. 765.) along with *Zonites nitidus*, and *H. rufescens*. It is found for a considerable distance along the chalk escarpment of the South Downs, facing to the North, and although more rare than the other species above mentioned, Dr. Lindsay collected about twenty specimens. It may probably have been introduced with some foreign plants and escaped, for it does not appear to have been found in any other locality.

Helix holosericea of Studer, and *H. diodonta* of Muhlfeld, found in various parts of the Continent, chiefly differ in the distinctness of their teeth on the lips.

f. CHILOTREMA *Leach.* (Rock Snail.)

Shell orbicular, depressed, perforated, equally convex on both sides, sharply carinated in its outer circumference; aperture transverse, oval; the peristome united all round, elevated from the other whorls, and margined; epiphragm membranaceous.

26. 8. HELIX *lapicida.* Variegated Rock Snail. (f. 51.) Shell umbilicate, finely granulate, grey or pale rufous with reddish rays or spots.

Helix lapicida. *Linn. S. N.* 1. 1241.; *Mont. T. B.* 435.; *Drap.* p. 111. t. 7. f. 35—37.; *Brard*, p. 53. t. 2. f. 14, 15.

Carocolla lapicida. *Lamarck*, vi. ii. p. 99.; *Turt. Man.* ed. 1. f. 51.

Latomus lapicida. *Fitz. Prod.* 97.

Helicogona lapicida. *Férus. Prod.* 150. t. 66*, f. 6.

Chilotrema lapicida. *Leach, Mollusc.* p. 106.

Helix acuta. *Da Costa*, p. 55. t. 4. f. 9.

List. Conch. t. 3. f. 4.; *Pet. Gaz.* t. 92. f. 11.

Var. 2. whitish. *Pfeiffer*, 2. f. 27.

In the fissures of limestone rocks, and in woods on a chalky soil.

Animal green or blackish green; neck granular, with two dark streaks; hinder part of the foot yellowish. (*Sturm*, t. 26.)

Shell three quarters of an inch in diameter, finely granulated; volutions five, the outer one sloping on both sides so as to form a sharp edge in the middle of the margin, which runs spirally round the upper volutions and marks their separation by a fine line; umbilicus central, large, and deep; aperture oval, with an indenture or small notch on the inside at the outer pointed extremity where the keel commences; the peristome broad, thin, white, reflected, united and detached all round.

Linnæus, from some fancy, called this shell *Lapicida* or stone cutter.

The shell is liable to some variations in size and colour. It is rarely pale greenish, nearly transparent; it also varies in the distinctness of the brown marbling.

The young shells, as in most other *Helices*, are much more depressed and more strongly keeled.

Dr. Fleming (*Brit. Anim.*) thought that the *Helix cochlea* of Brown (*Wern. Trans.* ii. t. 24. f. 10.) and *H. terebra* Turton (*Conch. Dict.* 161. t. 14. f. 55.) was probably a produced variety of this shell!

g. ZURAMA *Leach MSS.*

Shell depressed, transparent, umbilicated; mouth round; peristome reflexed, continued; epiphragm membranaceous.

27. 9. HELIX *pulchella.* White Snail. Shell opake-white or brownish, depressed, equally convex on both sides; aperture nearly circular, with the margin flat and reflected.

Helix pulchella. *Müller, Verm.; Drap.* p. 112. t. 7.

34.; *Brard*, p. 56. t. 2. f. 9.; *Alder*, *M. Z. & B.* ii. 109.

Helix paludosa. *Walker*, *T. M. R.* f. 23.; *Mont.* p. 204. *Linn. Trans.* viii. p. 193. t. 5. f. 5.

Turbo paludosus. *Turt. Dict.* p. 228.

——— helicinus. *Lightfoot*, *Phil. Trans.* 1786.

Zurama pulchella. *Leach*, *Mollusc.* p. 108.

Helix minuta. *Say.*

Amplexus paludosus. *Brown.*

Acrenellus. *Brown.*

Vallonia Rosalia. *Risso.*?

Lucena pulchella. *Hartmann*, t. 1. f. 6.

Var. 1. With regular oblique raised transverse striæ.

Helix pulchella. *Drap.* p. 112. t. 7. f. 30—32.

——— crenella. *Mont.* p. 441. t. 13. f. 3.

——— costata. *Müller*; *Alder*, *Mag. Z. & B.* ii. 109.

Inhab. under stones and on walls, &c.

Animal white or whitish; upper tentacles longish, slender, cylindrical, lower short; eyes black. (*Sturm*, t. 15.)

Shell the tenth of an inch in diameter; aperture nearly circular, being very little interrupted by the penultimate volution; the peristome margined and flat; umbilicus large and deep.

The specimens found in marshy damp situations are marked with elevated cross bands, which are the vestiges of former mouths. Those that are found in dry situations, under stones, in shells, &c., are generally destitute of any such ribs.

In *Helix aculeata* and *H. lamellosa* it is the periostraca only that is raised into concentric lamellæ.

Captain Brown has separated this shell into a genus under the name of *Amplexus*, and Risso has formed it into a genus called *Vallonia*, which he places next to *Valvata!*

M. Kickx has proposed once more to separate *H. costata* from *H. pulchella* specifically, on the ground of a difference between the animals. He describes the animal of *H. pulchella* as "milk-white; mantle yellowish; lower tentacles very short;" and *H. costata* as "rufous; mantle violet; lower tentacles scarcely visible." This difference does not exist in the English specimens examined by Mr. Forbes or myself, the animal of both varieties agreeing with the description given above of *H. pulchella.*

This species is also found in North America, according to Férussac.

h. HYGROMANES *Férussac.*

Shell depressed, perforated or umbilicated, horn-coloured or brown, nearly one-coloured; peristome slightly thickened, rather spread; periostraca pale, often bristly, especially in the young; bristles deciduous.

28. 10. HELIX *limbata.* White-keeled Snail. (f. 132.) Shell orbiculate, globose, slightly keeled, very finely striated, perforated, white or reddish, with an opake-white keel, mouth very oblique, semilunar, lip reflexed, margined, white.

Helix limbata. *Drap. Moll.* 100. t. 6. f. 29.; *Fér. Prod.* 43.; *Rossm. Icon.* v. 35. f. 362.

Helix circinata. *Brit. Conchologist*, not *Drap.*

Lives in the hedges near London, on the New North Road to Barnet, near Hampstead, on brambles.

(*G. B. Sowerby.*) Native of the south of France, whence, perhaps, it was introduced.

This species, which is found in the south of France, Switzerland, and Germany, was first discovered in England by Mr. Sowerby, in the habitat indicated; but it is extremely doubtful if it had not been accidentally introduced with some plant from the Continent, as, after considerable inquiries, I have not been able to hear of any other specimens having been observed, either in the same locality or any where else. Mr. Alder first added it to the British list. (*Mag. Zool. & Bot.* 106.)

It varies considerably in colour, some being nearly pellucid white, and others reddish brown; and the white band is always distinctly marked, but varies in width in different individuals.

This species is very like *Helix cinctella* and *H. incarnata;* it almost appears to unite them. We have received the dark variety, like that in Mr. Alder's cabinet, from M. N. Boubée as *H. incarnata:* it does not agree with Pfeiffer's, Sturm's, or other figures of that species.

29. 11. HELIX *Cantiana.* Kentish Snail. (f. 26.) Shell slightly depressed, subglobose, brittle, semitransparent, pale rosy, with an obscure paler band; region of the aperture rufous-brown; umbilicus small.

Helix Cantiana. *Montagu,* p. 422. t. 13. f. 1.; *Maton and Racket, Linn. Trans.* viii. 197.; *Fér. Prod.* 43.

Teba Cantiana. *Leach, Moll.* p. 94.

Helix Carthusiana. *Drap.* p. 102. t. 6. f. 33. (?)

Turton, Man. ed. 1. f. 26.; *Brard,* p. 24. t. 1 f. 6., not *Müller ; Férus. Prod.* 43.
Helix pallida. *Don. Br. Shell.* t. 157. f. 2.

In hedges in sandy and chalky districts.

Animal grey, above warty, brown.

Shell about three quarters of an inch in diameter, irregularly striate transversely, thin and nearly transparent, of a pale yellowish-white or lead-colour, rufous about the mouth and underneath; the lower volution tumid and well rounded, not carinated, but mostly marked with an obscure pale band in the middle; aperture semielliptic, as wide as long, with a thin but not reflected margin; the internal rib white or rosy; umbilicus small.

The young shells are very pale, pellucid, and with a rather hispid periostraca.

From the *Helix rufescens* it may be distinguished — 1. by its greater size and convexity; 2. in not being so strongly and regularly striate; 3. in wanting the subcarinated ridge on the lower volution; 4. in the umbilicus not being above half the size.

Férussac was at first inclined to consider this species as distinct from any of the continental shells (*Journ. Phys.* xc. 300.), but he afterwards considered it as a local variety of *H. Carthusiana* of Drap. All the French specimens I have seen are very different from our shells, and I think they want further examination; at any rate Lister's and Montagu's names have the priority, and *H. Carthusiana* was used by Müller for another species, for which it should be retained.

30. 12. **Helix** *Carthusiana.* Gibbs's Snail. (t. 3. f. 27.) Shell depressed, semitransparent, bald, rather shining, grey, with a milk-white band across the aperture externally; umbilicus minute.

Helix Carthusiana. *Müller*, *Verm.* 15., not *Drap.*

—— Carthusianella. *Drap.* p. 101. t. 6. f. 31, 32. and t. 7. f. 3, 4.; *Brard*, p. 24. t. 1. f. 7.; *Turt. Man.* ed. i. f. 27.

Teba Carthusianella. *Leach*, *Moll.* p. 95. t. 8. f. 4—6.

Helix Zenobia bimarginata. *Gray*, *Med. Rep.* 1821.

—— Gibbsii. "*Leach*," *Brown*, *Brit. Shells*, t. 40. f. 49. 51.

Var. smaller, rather more convex.

Helix rufilabris. *Jeffreys*, *Linn. Trans.* xvi. 509.

On stunted grass, on the Downs in the chalky districts of Kent and Sussex.

Animal grey above, yellowish below; tentacles long, flexible.

Shell not half an inch in diameter, more depressed than the last, and not so glossy, without the rufous stain about the mouth and underneath; aperture more narrowed; and the umbilicus very minute; on the outside of the aperture is a milk-white transverse band.

This species varies considerably; in size, in the thickness and the opacity of the shell, and in the distinctness of the double band round the mouth; the white band being most indistinct in the thinner specimens.

Baron Férussac, who received it from Dr. Leach, under the above name (not *H. Gypsii*, as he prints it), first recorded it as British (*Journ. de Phys.* xc. 300.)

in 1820; in 1821 I again noticed it in the *Medical Repository*, under the name of *H. bimarginata.*

Mr. Jeffreys thinks it probable that this species had been introduced from France (*Linn. Trans.* 509.), but I have seen it quite as common as *H. virgata* for many miles of the south coast of England, from Dover to Brighton; and it must have been introduced some years ago, as it was discovered by Mr. Gibbs in 1814.

Mr. Jeffreys considers his *H. rufilabris Var. a* to be *H. Olivieri* of Férussac, but this must be a mistake; for the latter is quite a distinct species, and not found in England. It is imperforated: there are specimens of it in the Museum collection.

31. 13. Helix *fusca.* Brown Snail. (t. 4. f. 36.) Shell subglobose, wrinkled, transparent, very brittle, rather flexible, amber-coloured, bald; aperture lunate; umbilicus very narrow; peristome thin.

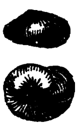
Helix fusca. *Mont.* p. 424. t. 13. f. 1.; *Turt. Dict.* p. 946., *Man.* f. 36.; *Jeffreys, Linn. Trans.* xvi. 321. 391. 507.; *Alder, Mag. Z. & B.* ii. 107.

Helix subrufescens. *Miller, Ann. Phil.*

—— Zenobia corrugata. *Gray, Med. Rep.* 1821. 239.

Inhab. damp woods among decayed leaves and thick herbage.

Animal yellowish; tentacles long.



Shell three-eighths of an inch in diameter, and a quarter of an inch high, very thin and pellucid, more or less wrinkled, glossy amber-coloured; aperture crescent-shaped, very thin, as long as broad, reflected only at the pillar-angle, where there is a minute perforation.

32. 14. **HELIX** *fulva.* Top-shaped Snail. (t. 5. f. 47.) Shell rather conic and trochiform, beneath flattish, with six volutions, dark horn-coloured, smooth, and glossy; aperture narrow crescent-shaped; umbilicus minute.

Helix fulva. *Müller, Hist.* 36.; *Nilson,* 13.; *Drap.* p. 81. t. 7. f. 12, 13.

Teba fulva. *Leach, Moll.* p. 99.

Helix trochiformis. *Mont.* p. 427. t. 11. f. 9.; *Jeffreys, Linn. Trans.* xvi. 331., not *Férussac.*

Helix Trochulus. *Müller* ? ? *Dillwyn,* p. 916. ? ?

——- nitidula. *V. Alten.*

——- Trochilus. *Fleming.*

Var. 1. *Mortonii.* Shell depressed, both sides nearly equally convex.

Helix Mortonii. *Jeffreys, Linn. Trans.* xvi. 332.

"Trochus terrestris β. Mortonii *Da Costa.*" *Jeffreys.*

Var. 2. *Alderi.* Smaller, darker. *Alder, Mag. Z. & B.* ii. 108.

Inhab. woods, among leaves and under stones, and on decayed wood.

Animal grey, shining; foot thin; tentacles long.

Shell the tenth of an inch in diameter, glossy, dark horn-coloured, with six rounded volutions, which are much raised and strongly defined; the base prominent, with a depression in the centre forming an incipient umbilicus; aperture transverse, narrow, as high as broad, with a very thin margin, reflected only near the depression, which in young shells is hardly visible.

Varies in the intensity of the colour and in transparency, the specimens found in very damp situations being generally much darker and more polished.

Mr. Alder observes, that the small variety is not uncommon; it is darker coloured, and with very delicate and beautiful concentric striæ on the base, only visible with a high magnifier, which induced him at first to consider it distinct; but on closer examination, he found slight traces of these striæ visible on the full-grown and decided specimens of *H. fulva;* he has therefore not ventured to separate it. (l. c. 108.)

33. 15. Helix *aculeata.* Prickly Snail. (t. 4. f. 33.) Shell conical, globose, brown horn-colour, with the suture deep; the periostraca rising into thin spinous foliations; aperture semielliptic.

Helix spinulosa. *Lightf*, *Phil. Trans.* lxxvi. 166.; *Montagu*, p. 549. t. 11. f. 10.; *Linn. Trans.* viii. 201.

Teba spinulosa. *Leach*, *Moll.* p. 100.

Helix aculeata. *Müller*, *Verm.* ii. 81.; *Drap.* p. 82. t. 7. f. 10, 11.; *Alder*, *Cat.* 109.

Helix delectabilis. *Solander*, *MSS.*

Inhab. woods, under leaves and stones.

Animal greenish; tentacles long.

Shell about the tenth of an inch wide, and as much high, thin, semitransparent, brown horn-colour; the volutions rounded and deeply separated, clothed with a thin periostraca, which rises into numerous regular rather oblique foliations shooting into points, exhibiting the appearance of a circle of bristles round the middle of each; aperture somewhat orbicular, as long as wide, with a white rib on the inside; umbilicus moderately large and deep.

According to the observations of Mr. Jeffreys, this animal feeds on the *Jungermannia platyphylla.* It has a very extended range, for it is found in the north of Sweden.

34. 16. HELIX *lamellata.* Scarborough Snail. (t. 5. f. 48.) Shell somewhat trochiform, grey; the periostraca rising into close-set equal longitudinal lamellæ; whorls six, gradually increasing in size; mouth lunate; umbilicus deep.

Helix Scarburgensis. *Turton*, ed. 162.; *Alder*, *Cat.* 109.

Helix holosericea. *Miller*, *MSS.*

—— lamellata. *Jeffreys*, *Linn. Trans.* xvi. 333.; not H. lamellosa *Férussac.*

Inhab. woods, north of England — Scarborough (*Bean*), Newcastle (*Alder*).

Animal pale grey.

Shell the tenth of an inch in diameter, and as much high, grey or pale horn-colour, semitransparent, pyramidal, with very numerous regular longitudinal lamellæ not shooting in the middle into spinous projections; spire composed of six rounded and deeply divided volutions, which very gradually decrease from the tumid and rounded base; the tip obtuse and usually of a whitish colour; aperture narrow crescent-shaped, wider than long, the margin thin and reflected over the umbilicus, which is small and deep.

Like that of *H. aculeata*, the periostraca of this species rises into thin laminar foliations, which in various positions of light reflect a velvety or satin-like lustre; but the foliations are infinitely more numerous and compact, not shooting into spinous processes in the middle; the shape of the spire is also very different, not decreasing in a conical manner, but regularly pyramidal; and the aperture, instead of projecting forward in a semielliptic form, is narrow crescent-shaped, without the internal rib round the margin.

For this extremely beautiful and interesting acquisition, we are indebted to the diligence of Mr. Bean of Scarborough, who first discovered it in the woods near that place.

Mr. Jeffreys's name must be retained, as his paper was published while Mr. Alder's was passing through the press.

35. 17. HELIX *granulata.* Granular Snail. (t. 3. f. 29.) Shell somewhat globular, transparent, rather shining, yellowish horn-colour, closely hairy, with nearly six tumid volutions; mouth roundish lunate; umbilicus very small.

Helix granulata. *Alder, Cat.* 107.
—— sericea. *Turton, Man.* ed. 1. 38. f. 29.; *Jeffreys, Linn. Trans.* xvi. 333.; not *Drap.*
Helix hispida. *Montagu,* t. 23. f. 3.; *Linn. Trans.* viii. 198.
Teba hispida. *Leach, Moll.* p. 98.
Helix globularis. *Jeffreys, Linn. Trans.* xvi. 507.

Inhab. moist woods and hedge banks.

Animal pale yellowish white; head and tentacles grey; mantle beautifully speckled with black, the black blotches being larger towards the upper extremity, and giving the higher whorls of the shell a mottled appearance when alive; the foot is short and thick.

Shell a quarter of an inch in diameter, and as much high, pale horn-colour, frequently a little rufous about the mouth, extremely thin and light, clothed with a very fine down enlarged at the base, which, when worn off, leaves the surface glossy and minutely granulate like shagreen; aperture crescent-shaped, rather wider than long, very thin, and reflected only at the umbilicus, which is extremely small. The larger volution is well rounded, without keel or band, and the internal rib only visible in full-grown specimens.

This is evidently not the *H. hispida* of the continental writers, nor the *H. sericea* of Müller or Draparnaud.

36.18. HELIX *revelata*. Green Snail. (t.//f. 133.) Shell orbicular, subglobose, thin, finely wrinkled, umbilicated, diaphanous, shining pale green, with a few scattered hairs; whorls convex, last largest; peristome thin.

Helix revelata. *Férussac, Prod.* 44.; *Michel, Compl.* 27. t. 15. f. 6, 7, 8.; *Desh. Lam. Hist.* viii. 83.

Inhab. shady places, among nettles. (Guernsey.)

Animal blackish.

Shell thin, nearly transparent, green; the mouth large, roundish lunate, very oblique; the umbilicus rather narrow, only showing the penultimate whorl; the peristome is thin, and very slightly reflexed. Most like *H. fusca* but not so thin, and smooth, green, and umbilicated.

This interesting addition to our Fauna was discovered by Mr. Edward Forbes, in abundance, near Doyle's Monument, in Guernsey, whence he kindly brought me specimens, some of them containing the living animal.

37. 19. **Helix** *sericea.* Silky Snail. (t. 11. f. 134.) Shell rather globular, thin, transparent, reddish horn-coloured, nearly smooth, or slightly wrinkled, with six whorls thickly set with soft recurved hairs; outer lip thin, without any ribs; umbilicus small.

Helix sericea. *Müller*, — *Drap.* t. 7. f. 16, 17.; *Kenyon*, *Mag. N. H.* t. 427. f. 3.; *Alder*, *Mag. Zool. & Bot.* ii. 107.; not *Turton*, *Man.* ed. 1.

Helix hispida. *Gilbertson*, *MSS. B. M.*

Inhab. woods (?) North of England.

Animal greyish, marbled with black.

Shell subglobular, three tenths of an inch in diameter, dark brown, thin, pellucid, with a very obscure whitish central band, giving it a rather keeled appearance, covered with a brown periostraca with distant elongated hairs; umbilicus rather small (partly covered with the front of the lip), only showing the last whorl but one.

Mr. Alder, who first noticed this species in England, observes, "It is difficult to say whether or not this is the *H. sericea* of Müller, I having introduced it as such on the faith of Baron de Férussac. I leave it for further investigation."

This shell varies from dull reddish to nearly pure translucid white.

Mr. Kenyon gave the accompanying figure as *H. sericea* of Draparnaud.

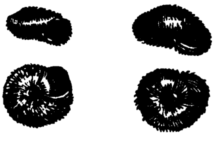
The shell is thinner, more globular, and with the umbilicus smaller than *H. hispida;* of a darker colour, and with the apex more depressed than *H. granulata.*

38. 20. **Helix** *hispida.* Bristly Snail. (t. 4. f. 41.) Shell slightly convex, a little carinate, striolate, transparent, horn-coloured; periostraca hairy, with crowded bristles; umbilicus moderate, deep; mouth roundish lunate.

Helix hispida. *Müller, Verm.* 73.; *Turton, Man.* ed. 1. 57. f. 41.; *Drap.* p. 103. t. 7. f. 20. 22.; *Brard,* p. 27. t. 2. f. 1.; *Jeffreys, Linn. Trans.* xiii. 338.; not *Montagu.*

Inhab. woods, under stones, in shady places.

Animal grey, foot white, thick.



Shell about a quarter of an inch in breadth, and hardly as much high, horn-coloured, with a slight paler band in the middle of the larger volution; periostraca clothed with close fine hairs which are very caducous, under which it is a little striate, but not granular, like the *H. granulata;* aperture moderate.

39.21. **Helix** *concinna.* Neat Snail. (t.xii f. 135.) Shell rather depressed, slightly keeled, rather shining, reddish brown, concentrically grooved, with scattered deciduous whitish hairs; whorls five or six; mouth roundish lunate, margined; umbilicus broad.

Helix concinna. *Jeffreys, Linn. Trans.* xiii. 337.; *Alder, Mag. Z. & B.* 107.

Helix depilata. *Pfeiffer,* i. t. 35., t. 2. f. 18. (?); *Alder, Mag. Z. &. B.* 107.

Helix rufescens. *Swiss Conchologists.*

Inhab. under stones, and dry places, among nettles, &c.

Animal reddish, very polished; tentacles longish.

Shell very like the former, but differs in being rather larger, the umbilicus wider, and the hairs further apart, and much more deciduous, which makes it often appear smooth, except near the sutures and umbilicus.

Mr. Jeffreys, after examining many hundred specimens from different localities, is inclined to think that it must be referred to *H. hispida*. (*Linn. Trans.* xiii. 510.)

Mr. Alder observes that this may be a variety of *H. hispida*, as was supposed by Mr. Jeffreys, but is stronger, and with the hairs more deciduous than the usual form of that species. It is very generally diffused, commonly taking the place of *Helix glabella* (*H. rufescens*), in situations where the latter is not found. (*Alder*, *Mag. Z. & B.* ii. 107.)

Mr. Alder also refers to *H. circinnata* of Férussac, which Rossmäsler regards as a distinct species.

39*. 21*. Helix *depilata*. Bald Snail. (t. xii. f. 135*.)
Shell somewhat globular, depressed, pale, bald; whorls rounded, concentrically grooved; mouth lunate; peristome thickened, white; umbilicus moderate.

Helix depilata. *Pfeiffer*, i. 33. t. 2. f. 18. (?); *Alder*, *Mag. Zool. & Bot.* ii. 107.

Inhab. hedges and wet places.

This species is very like the former, but quite destitute of hairs in all its stages; it is much smaller in all its parts than any of the varieties of *H. rufescens*.

Mr. Alder states that his specimens agreed perfectly with those of Pfeiffer in Férussac's cabinet; Mr. Jeffreys refers to Pfeiffer's figures with doubt, as representing *H. concinna;* and Mr. Alder says it is not to be distinguished from it except by its not being hispid in any of its stages. Rossmäsler regards *H. depilata* of Jeffreys as the same as *H. sericea* and *H. glabella,* and refers Turton's figure of *H. granulata* to this species!

I do not think the four last species are in any way satisfactorily determined; they may be only varieties of one another, or there may be more species, but this can only be determined by collecting together a very large number of specimens from their natural situations (not as collected among the rejectamenta of rivers); observing how the specimens of the same locality or brood vary, and how the periostraca and the hairiness is affected by their being kept alive, and also by the kind of place they may inhabit. The synonyma of the foreign authors are even more doubtful, but this is occasioned by our seldom receiving the same species or variety of these hairy *Hydromanes,* under the same name, from our foreign correspondents and the dealers. Indeed, the foreign species, judging from the very different synonyma of the continental authors, are as confused as our own.

40. 22. HELIX *rufescens.* Rufous Snail. (t. 3. f. 28.) Shell flattish, bald, reddish horn-colour, concentrically striate, slightly carinated by a narrow central paler band; whorls six; mouth roundish lunate; umbilicus large and deep.

Helix rufescens. *Penn. B. Z.* f. 34.; *Montagu,* p.

420. t. 23. f. 2.; *Fér. Prod.* 44.; *Turton, Man.* ed. i. 87. f. 28.; *Jeffreys, L. T.* xiii. 337.

Teba rufescens. *Leach, Mollusc.* p. 96.

Helix glabella. *Drap.* p. 102. t. 7. f. 6.; *Fér. Prod.* 43.; *Alder, Mag. Z. & B.* iii. 107.

Inhab. gardens and hedges.

Animal black-grey; upper tentacles thick.

Shell growing to three quarters of an inch in diameter, but often smaller, semitransparent, varying from pale ash-colour to rufous brown, often marbled and mottled with paler or darker blotches, rarely pure white, slightly carinate in the middle of the larger volution by a paler band; aperture semielliptic, thin, and slightly reflected, longer than broad. Both the young and old shells are quite bald.

Montagu, and all who have copied from him, have represented the young of this species as clothed with hairs. He probably mistook the *Helix hispida* for it.

Lister gives some details of the anatomy of this species (*Anat.* t. 4. f. 4.).

The shell varies greatly in colour, being generally reddish brown, but passing from that colour to nearly transparent or translucent white; and in shape and size. Tab. 4. f. 36., which Dr. Turton, in the first edition, gave for *H. fusca*, appears to represent a small higher variety of this species, which is often met with near Battersea.

Montagu's name has the undoubted priority.

i. HELIOMANES *Férussac.*

Shell subglobose, perforated or umbilicated, white or reddish, varied with bands; peristome edged, not spread; periostraca thin, bald; epiphragm membranaceous.

41. 23. HELIX *pisana.* Banded Snail. (t. 4. f. 30.) Shell subglobose, with the larger volution rather flat at top, marked with numerous brown and yellowish often interrupted bands; the mouth rounded lunate; throat mostly rose-colour.

Helix pisana. *Müller, Verm.* 60.; *Lam. H.* vi. 82.
—— petholata. *Oliv. Ad.* 178.
—— cingenda. *Montagu,* p. 418. t. 24. f. 4.; *Linn. Trans.* viii. 195. t. 5. f. 6., xiii. 333.
Helix albina. *Müller,* 25.
Teba cingenda. *Leach, Mollusc.* p. 92.
Helix zonaria. *Penn. B. Z.* iv. 137. t. 5. f. 133.
—— rhodostoma. *Drap.* p. 86. t. 5. f. 13—15.
—— strigata var. *Dillwyn,* p. 911.

Inhab. dry sandy plains near the sea.

Animal yellowish white; neck purplish; tentacles long, club-shaped.

Shell about half an inch in diameter, and not so much high, with the volutions a little flattened at top, slightly striate; colour whitish or yellowish, rarely without coloured bands, but mostly with seven or eight brown circular lines on the lower volution, often broken into dots; the tip black; these bands are very variable; aperture longer than wide, with the margin thin and reflected at the pillar, where it half closes the narrow but deep umbilicus; the region of the mouth is generally of a more or less intense rose-colour.

It varies greatly in the distinctness, the strength, and the disposition of the bands: sometimes they are altogether wanting, and at others (rarely) suffused over the surface. It also varies in the colour of the throat, which is generally rose-coloured, but sometimes pure white.

It varies greatly in size, according to the situation; and also in form, varying from subglobose to subconic, or depressed, as in other species of the genus.

Monstrosities are sometimes found with the whorls reversed, and more or less produced.

It is one of the most beautiful of our snails, and extremely local. It is common in the south of Europe and Northern Africa; but is not found in the northern countries: Wales may be considered its northern limit.

Mr. Jeffreys believes the beautiful pink gloss observed on the mouths of this and *H. virgata* to be entirely owing to the action of, and exposure to, the sun; for, in the specimens found in more sheltered situations, the colours and marking are much fainter, and sometimes altogether wanting. (*Linn. Trans.* xvi. 334.) It most probably arises from the animal being in better health in sunny places, as it is most like the warmer climate in which they appear to delight, beyond the confines of which our specimens are living.

According to Montagu, it is one of our most rare species. He only found it in one place, on the sand to the west of Tenby, where it is confined to a small spot. Mr. Racket has found it at St. Ives, in Cornwall. It has also been said to be found near Dublin.

42. 24. **Helix** *virgata*. Zoned Snail. (t. 4. f. 31.) Shell somewhat globular, white, with from one to six brown bands; the mouth dull rufous; umbilicus moderate.

Helix virgata. *Montagu*, p. 415. t. 24. f. 1.; *Turton*, *Man.* ed. 1. 40. f. 31.
Teba virgata. *Leach*, *Mollusc.* p. 93.
Helix variabilis. *Drap.* p. 84. t. 5. f. 11, 12.; *Férussac*, *Journ. Phys.*, 297.; *Rossm. Icon.* t. 26. f. 356. *a.* f.
Helix striata. *Brard*, p. 36. t. 2. f. 5, 6.
—— zonaria. *Donovan*, ii. tab. 65.
—— pisana. *Dillwyn*, p. 911.
—— subalbida. *Poir. Prod.* 83.

On short grass, on sandy plains, especially about the sea-coasts.

Animal purplish-ash; foot thick, yellowish.

Shell about half an inch in diameter, and nearly as much high, usually white with a single dark brown band in the middle of the larger volution, and several irregular ones at the base; but subject to infinite variations from the presence or absence or confluence of the bands, the most singular of which is that of a dark brown with a single white band, and that of a pure opake white with transparent white bands, the tip generally black; about the mouth and pillar dull rufous; aperture longer than broad, the margin thin and reflected at the umbilicus, which is small and deep.

When young, the larger volution slopes to a somewhat carinated edge.

Varies greatly in size, being sometimes three fourths of an inch in diameter, and at others not one third of that size: in colour, being sometimes pellucid white and bandless, and generally opake and very distinctly banded; and, from the number of its bands, it offers an almost endless variety of banding; sometimes the colouring which forms the bands is suffused over the whole shell, making it brown, or even nearly black.

It also varies sometimes in shape, and slightly in the elevation and depression of the spire, and in the size of the umbilicus; from its abundance, it is very liable to the usual distortions.

Distorted specimens of this shell are sometimes found with the whorls reversed, or more commonly produced out of their usual course. It was a specimen of this monstrosity that was called *Helix elegans* by Brown (*Wern. Trans.* vi. 528. t. 24. f. 9.) and *H. disjuncta* by Turton (*Conch. Dict.* 61. f. 63.).

Mr. Alder says that a very small variety of this shell is found on the coast of north Devon, which is probably the *Helix maritima* of Draparnaud. I have not been able to see this variety. It is also referred to by Jèffreys (*Linn. Trans.* xiii. 335.), but the continental authors do not mix them together.

In the autumn, these shells are often suddenly observed in such great numbers as to give rise to the popular notion of their having fallen from the clouds; and in very hot weather, the young both of this species and the *H. cingenda* may be found in clusters adhering to the stalks of various plants, with the aperture closed by a thin pellicle (*epiphragm*), except where it is in contact with the plant.

43. 25. **Helix** *caperata.* Black-tipped Snail. (t. 4. f. 32.) Shell flattish, yellowish, with brown interrupted bands and spots, and strongly striated concentrically; umbilicus moderate; mouth white.

Helix caperata. *Montagu,* p. 433. t. 11. f. 11.; *Turton, Man.* ed 1. 42. f. 32.; *Jeffreys, Linn. Trans.* xiii.

Teba caperata. *Leach, Mollusc.* p. 97.

Helix striata. *Drap.* p. 106. t. 6. f. 18—21.; not *Müller.*

Helix intersecta. *Brard,* p. 39. t. 2. f. 7.

——— crenulata. *Dillwyn,* p. 895.

On dry banks, and under stones in hilly places.

Animal yellowish-ash, warty above, foot thickish.

Shell seldom half an inch in diameter, and a quarter of an inch high, rather depressed; the larger volution sloping to a somewhat carinate edge in the middle, with regular deep transverse striæ; colour dull yellowish-white, with regular brown bands, which are often interrupted, and the tip black; aperture crescent-shaped, as long as it is broad, with the margin thin and not reflected over the umbilicus, which is large and deep.

Like the preceding, it is equally liable to vary in size, colour, and form, and offers nearly the same variations. It is immediately known from that species by being more depressed, and strongly concentrically striated.

Montagu's names for the two last have the priority.

Mr. Alder observes, that he has not seen any British variety of this shell similar to *H. candidula* Studer, referred to by Mr. Jeffreys.

44. 26. HELIX *ericetorum.* Heath Snail. (t. 4. f. 37.) Shell depressed, semitransparent, grey or brownish, and generally banded; aperture roundish; umbilicus very large and deep.

Helix ericetorum. *Müller, Verm.* ii. 226. var. *a.* ; ? *Montagu,* p. 437. t. 24. f. 2.; *Turton, Man.* ed. 1. 54. f. 37.; *Brard,* p. 45. t. 2. f. 8.
Zonites ericetorum. *Leach, Moll.* p. 101.
Helix cespitum, b. *Drap.* p. 109. t. 6. f. 16, 17.; *Pfeiffer,* 39. t. 2. f. 24, 25.
Helix erica. *Da Costa,* p. 53. t. 4. f. 8.
—— albella. *Penn.*

On dry heaths and downs, on the stalks of the larger plants.

Animal greenish-white; foot slender, pellucid. (*Sturm, Fauna,* t. 24.)

Shell nearly an inch in diameter, much depressed at top, slightly striolate, of a grey or rusty-brown colour, with generally a brown band above continuing round the edge of the smaller volutions; sometimes the bands are so obliterated as to be hardly visible; aperture nearly orbicular, not much interrupted by the penultimate volution, longer than broad, the peristome very thin and not reflected; umbilicus very large, and so open and deep as to expose three or four of the volutions.

This shell varies greatly in colour, being often distinctly banded, and at other times quite bandless, when it is *H. obliterata* of Hartmann. The bands vary in number, those on the front of the whorls being most generally present. It also varies very much in size, being sometimes an inch in diameter (see *Pfeiffer,* t. 2. f. 24, 25.), and at others not one third of that size

(*Pfeiffer*, t. 2. f. 23.): when full grown; the smaller shells are always rather thicker. It is always known from *H. cespitum* of Drap. by the spire being lower and the umbilicus wider. Mr. Jeffreys speaks of one with a more produced spire found in Iona, Western Islands (*Linn. Trans.* xiii. 339.), but I have not seen any that agree with Draparnaud's species.

Lister, in his anatomical plates (t. 2. f. 10.), gives some details of the anatomy of this species.

5. Zonites *Montf.* (Zonites.)

Animal with an elongate depressed foot, and a large produced central spiral body, covered with (and contractile into) a depressed or hemispherical, thin, shell with flattish spire, and a large lunate mouth, with thin simple lips, which are neither thickened nor reflexed; the tentacles are four, the two lower ones small and club-shaped.

The animal can entirely withdraw itself into the shell, and this genus is at once known from the former by the thinness and generally polished state of the shell, and also by its being depressed and destitute of any internal rib round the edge of the mouth.

It is intermediate between the Helices and the foreign genera *Stenopus* and *Nanina* of the family *Arionidæ*. The animal also resembles the latter in some respects, but wants the gland on the end of the foot. It is very probable that other peculiar characters will be found when the animals of the different species of *Helicidæ* have been described and compared together, as Mr. Nunneley has so excellently well done with the species of slugs.

This genus is divided into two sections, which may prove genera: —

a. Shell brown or varied, striated. *Verticillatæ* Férussac, n. 1—3.

b. Shell hyaline, greenish or pale brown, polished. *Hyalinæ* Férussac, n. 4—12.

a. VERTICILLATÆ *Férus.*

Shell brown or varied, striated.

45. 1. ZONITES *rotundatus.* Radiated Snail. (t. 5. f. 44.) Shell flattish, slightly carinate, deeply striate, rufous-grey with chestnut spots.

Helix radiata. *Montagu,* p. 431. t. 24. f. 3.; *Da Costa,* p. 57. t. 4. f. 15, 16.; *Turton, Man.* ed. 1. 59. f. 44.

Helix rotundata. *Müller,* 29.; *Drap.* p. 114. t. 8. f. 4.; *Brard,* p. 51. t. 2. f. 10, 11.; *Jeffreys, L. T.* xiii. 342.

Zonites radiatus. *Leach, Moll.* p. 102.

Var. b., spire quite flattened.

Helix Turtoni. *Fleming, Brit. Anim.* 269.

—— albella. *Linn. S. Nat.*

—— rotundata. *Turton, Dict.* p. 53.

Var. c., white, transparent, and without rays.

Common under stones and wood, on hills.

Animal pale grey, dotted above; foot short, hyaline; back, head, and tentacles blackish. (*Sturm.*)

Shell about a quarter of an inch in diameter, nearly equally convex on both sides, slightly carinate, strongly and regularly striate across, yellowish or reddish-grey with chestnut rays from the centre; aperture semilunar, as wide as long, thin and not reflected; umbilicus large and deep.

This species varies in size and in form, especially of the spire, which is sometimes rather convex, and at others nearly flat: in the latter form, it has been considered as a separate species; and Nilson believes that the shell which Linnæus described as *Helix albella* in his Swedish Fauna, is only a young species of the flat-spired variety of this shell. It also varies in the intensity of the brown spots on the spire; sometimes they are diffused and at others entirely wanting, and the shell is sometimes nearly transparent and colourless.

46. 2. ZONITES *umbilicatus.* Open Snail. (t. 5. f. 45.) Shell convex, somewhat trochiform, blackish-brown, opake, striolate; aperture nearly circular; umbilicus very large.

Helix umbilicata. *Mont.* p. 434. t. 13. f. 2.; *Jeffreys, Linn. Trans.* xiii. 843.
Helix rupestris. *Drap.* p. 82. t. 7. f. 7—9.; *Turton, Man.* ed. 1. 60. f. 45.
Zonites rupestris. *Leach, Moll.* p. 103.

On elevated rocks, and under the top stones of walls and lofty buildings, always in dry places.

Animal black-grey, polished; upper tentacles cylindrical.

Shell the tenth of an inch in diameter, elevated on the upper side, with five rounded and deeply divided volutions, slightly striate, of an uniform deep opake chocolate brown; aperture nearly circular, being very little interrupted by the penultimate volution, the margin thin and not reflected; umbilicus funnel-shaped.

This shell varies in the elevation and depression of the spire.

Montagu observes, it is remarkable that "this shell always affects such lofty places as the tops of houses, without one being found near the base; and in that situation its inhabitant braves equally the scorching beams of the sun in summer and the frigid wind of winter, without attempting to descend." (*T. B.* 435.)

Colonel Montagu's name should be retained for this species, as his work was published in 1803, and Draparnaud's in 1805. The English conchologists, not paying attention to this fact, have very generally committed an injustice to their countryman in favour of a foreigner, in a manner of which few foreign naturalists would be guilty. Indeed, few of them have been willing to do sufficient justice to Montagu's great merit; for he was almost the first zoologist in modern times who attempted to pay any attention to the animals inhabiting shells; and we should recollect that, during the whole time he was writing, he was shut out by the war from any communication with our continental brethren, and was solely dependent on his own energies.

47. 3. ZONITES *pygmæus.* Pygmy Snail. (t. 5. f. 46.) Shell rather convex, pale chocolate-brown, semitransparent; aperture semilunar; umbilicus large.

Helix elegans. *Sheppard's MSS. Brit. Mus.*

—— pygmæa. *Drap.* p. 114. t. 8. f. 8—10.; *Gray, Med. Rep.* 1821, 239.; *Turton, Man.* ed. 1. 61. f. 46.; *Nilson, Suec.* 32.; *Jeffreys, Linn. Trans.* xiii. 343.

Helix Kirbii. *Sheppard, Linn. Trans.* xvi. 162.; *Jeffreys, Linn. Trans.* xiii. 512.

Inhab. ditches and wet places, among dead leaves.

Shell half the size of the last, of a pale and hardly transparent brown horn-colour, slightly striate, equally convex on both sides, with the apex usually whitish as if decorticated, with four well defined volutions; aperture roundish crescent-shaped, as long as it is wide.

Dr. Leach considered this as the young of the last species, from which it evidently differs in colour, appearance, and locality, as the two species are never found together. It is much flatter and more transparent; it has only four volutions; and the aperture is not so circular.

Mr. Jeffreys says (*Linn. Trans.* xiii. 512.) that M. D'Orbigny has informed him that the *Helix pygmæa* of Draparnaud is our *H. umbilicata*, and not our *H. pygmæa*.

Mr. Alder says, notwithstanding the information communicated by M. D'Orbigny to Mr. Jeffreys, he still holds the opinion that this is the true *H. pygmæa* of Draparnaud; many naturalists, he says, have erroneously considered it to be the young of *H. umbilicata* Mont.

This species was first noticed as British in the *Medical Repository* for 1821. It is very distinct from the preceding.

b. HYALINÆ *Férus*.

Shell greenish or pale brown, hyaline, polished, smoothish.

48. 4. ZONITES *alliarius*. Garlic Snail. (t. 4. f. 39.)
Shell nearly flat, slightly globular, thin, transparent, horn-coloured, very shining, nearly smooth;

whorls four, under-side slightly tinged with opake white; umbilicus rather large.

Helix alliaria. *Miller*, *Ann. Phil.* n. s. vii. 379.; *Alder*, *Cat.* 12. n. 48.; *Mag. Zool. & Bot.* ii. 108.; *Turton*, *Man.* ed. i. 56. f. 39.

Helix nitens. *Sheppard*, *Linn. Trans.* xvi. 160.

——— fœtida. *Stark*, *Elem. N. Hist.* ii. 59.; *Brown*, *Brit. Shells*, t. 40. f. 48—52.

Helix alliacea. *Jeffreys*, *Linn. Trans.* xiii. 341. 511.

Helix nitida. *Shepp. Linn. Trans.* xiv. 160.(?)

Var. 1., transparent greenish white.

Var. 2., larger. *Alder*, *Mag. Zool. & Bot.* ii. 108.

Helix glabra. *Studer*, *Férus. Prod.* n. 215.

Inhab. woods, under stones, decayed leaves, and moss.

Animal black; tentacles short, cylindric, emitting a strong smell of garlic when irritated.

Shell about one quarer of an inch in diameter. It differs from Z. *cellaria* in being not above one third the size, and more convex, in having the aperture less oblique, the umbilicus larger, and the white on the under side not so well defined; from Z. *nitidula*, in being smaller, and in its bright glossy lustre and transparency.

This species was first discovered by the late Mr. Miller of Bristol.

Dr. Johnston does not consider *H. nitida* and *H. nitidula* as distinct from *H. alliaria* of Miller; he found all under one stone, selected four nearly of one size, and none of them had any garlic smell when alive; but on immersing them one by one in hot water, two emitted a very strong garlic-like odour, in one it was faint, and in the other it was not perceptible. It would appear, therefore (he continues), that the animal has the power to retain or emit its peculiar odour at pleasure; and that in death its emission may be prevented by accidental circumstances: he thinks it arises from the yellow fluid pressed out about the head.

49. 6. ZONITES *cellarius.* Cellar Snail. (t. 4. f. 40.) Shell flat, pale yellowish horn-colour, transparent, shining, very slightly wrinkled, with 5 or 5½ whorls; the under side clouded with opake white; umbilicus moderately large, exposing the second whorl.

Helix cellaria. *Müller, Verm.* 28.; *Lam. Hist.* vi.; *Alder, Cat.* 12. n. 47.; *Mag. Zool. & Bot.* ii. 208.

Helix nitida. *Drap. Moll.* 117. t. 8. f. 23. 25.; *Brard,* 31. t. 2. f. 2.

Helix nitens. *Maton and Racket, Linn. Trans.* viii. 198. t. 5. f. 7.; *Férussac, Prod.*

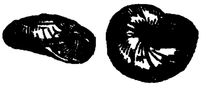
Helix lucida. *Montag. T. B.* 425. t. 23. f. 4.; *Turt. Man.* ed. 1. f. 40.

Zonites lucida. *Leach, Moll.* 10.

Inhab. under stones in fields and woods, and in cellars and yards in cities.

Animal pale grey, white when young.

Shell rather less than half an inch in diameter, but sometimes growing to nearly three quarters of an inch, glossy and irregularly striate, with 5 or 5½ volutions, which are well defined by the suture; underneath milky-white, especially about the umbilicus, which is large and



very deep; aperture oblong crescent-shaped, compressed, oblique, as long as it is wide.

Mr. Alder observes, that continental specimens of this shell are larger and rather more open in the umbilicus than British ones; which induced M. de Férussac to think that they might be distinct. The same remark is applicable to *Helix nitidula*, but in both cases he thinks it amounts to nothing more than a variety. *H. nitens* Fér. Tab. Moll. is only the English variety of the species in a small state.

H. nitens of Michaud, if we may judge from the figures, is *H. nitidula* Drap. Mr. Alder suspects Michaud's *H. nitidula* is, like that of Pfeiffer, the *H. nitidula* var. *β* of Drap., which is his *H. radiatula.*

Dr. Turton, in the first edition of this work, misplaced the numbers of these shells: they ought to have been reversed; fig. 38. is *Z. lucidus* and 40. *Z. cellarius.*

50. 7. ZONITES *purus.* Delicate Snail. (t. 4. f. 43.) Shell depressed, rather shining, transparent white, slightly striated or wrinkled, with four shining whorls set diagonally; under side more flattish than the upper, and without any appearance of opacity; umbilicus rather large.

Helix pura. *Alder, Cat.* 12. n. 46.; *Mag. Zool. & Bot.* ii. 108.; *Turton, Man.* ed. 1. 59. (not the figure).

Helix nitidula var. *β*. *Jeffreys, Linn. Trans.* xiii. 511.

Helix Alderi. *Bean, MSS.*; *Brit. Mus.*

Var. Shell pale horn-colour; animal rather darker. *Alder, Cat. Mag. Zool. & Bot.* ii. 108.

Helix nitidosa. *Fér. Tab. Moll.* (not synonyma).

Inhab. under stones, decayed leaves, &c., in woods.

Animal white, with two black lines; mantle white, speckled with black.

Shell varying from one fifth to one sixth of an inch in diameter, somewhat like *Z. crystallina*, but larger, more convex, and less shining, the whorls less closely set, and the outer one larger in proportion to the rest: the umbilicus is also larger.

Mr. Jeffreys considers it as a variety of *H. nitidula*, but Mr. Alder justly observes, that it differs from that species in being scarcely one third the size, of a different colour, and without any trace of opacity underneath. This species preserves its characters unchanged even when living in the midst of its allies.

Férussac refers to *H. nitidula* a. Drap. for this species. There is no such variety. Var. *β*. of that author, which Mr. Alder thinks he evidently intended to refer to, is his *H. radiatula*. His species has neither been figured nor described; but Mr. Alder observes that the specimens in his cabinet are undoubtedly the horn-coloured variety of *H. pura*. (l. c. 108.)

Mr. Alder observes, "Dr. Turton's figure of *H. pura* (f. 43.) is not a bit like the shell; it is five or six times too large, and the wrong colour. If intended to be magnified, it should be so stated, and a figure of the natural size put alongside." (*Letter*, May 30.)

51. 8. ZONITES *nitidulus*. Dull Snail. (t. XII. f. 136.) Shell nearly flat, deep yellowish horn-colour, sub-pellucid, rather strongly wrinkled, of a dull waxy appearance above, more shining below, except near the umbilicus, around which it is of

an opake white; whorls 4½; umbilicus large, exposing the second whorl.

Helix nitidula. *Drap.* 117. t. 8. f. 21, 22.; *Gray, Med. Repos.* 1821. 239.; *Shepp. Linn. Trans.* xiv. 160.; *Alder, Cat.* 134. 49.; *Mag. Zool. & Bot.* ii. 107.; *Jeffreys, Linn. Trans.* xiii. 340.

Var. 1. *Helmii*, transparent greenish white. *Alder*, l. c. 107.

Helix Helmii. *Gilbertson, MSS. British Museum.*

Inhab. hedge sides, under stones, &c.

Animal dark lead-colour. (*Sturm*, t. 12.)

Shell about three tenths of an inch in diameter. Differs from *Z. cellaria* in being smaller, rather more convex above, and more concave beneath; of a dull lustre, darker colour, and more strongly wrinkled above; the umbilicus is larger, and the aperture set at a less oblique angle; the opake white, also, is not so much diffused over the base of the shell, but it is confined to the edge of the umbilicus. The animal is of a darker colour. (*Alder.*)

Mr. Gilbertson thinks that there are some peculiarities in the habit of the animals, together with the white colour of the variety of the shell, which induces him to consider *Z. Helmii* as distinct from *Z. nitidulus*, but as yet he has not published his observations on it.

52. 9. ZONITES *radiatulus.* Rayed Snail. (t. 5. f. 137. and 50.*?) Shell depressed, horn-coloured, rather shining, transparent, regularly striated; 3½ or 4 whorls, flattened at their junction with the inner ones, over which the striæ appear continuous and strongly marked, giving

(t. 5. ?

the shell a radiated appearance (under a magnifier); the outer whorl rather large in proportion to the rest, under side smooth, without any whiteness; umbilicus moderately large.

Helix striatula. *Gray, Med. Repos.* 1821. 239.
—— radiatula. *Alder, Cat.* 12. n. 50.; *Mag. Zool. & Bot.* ii. 207.; *Jeffreys, Linn. Trans.* xiii. 511.
Helix nitidula. *Pfeiffer, Michaud.*
———— *β. Drap.*
—— brevipes. *Turton, Man.* ed. 1. t. 5. f. 50.??
Var. 1. *Vitrina*, transparent, greenish white.
Helix vitrina. *Férussac, Prod.*

Inhab. woods, &c. in wet moss.

Animal black.

Shell about one twentieth of an inch in diameter.

This species may be distinguished from the young of the other Zonites by the regular and more distinct striæ, and particularly by the flatness of the whorls at their junctions.

This shell was first indicated as British in the *Medical Repository* for 1821, but as it was not described, Mr. Alder's name must be adopted.

53. 10. ZONITES *lucidus.* Lucid Snail. (t. 4. f. 38.)
Shell depressed, rather convex, thin brownish horn-colour, transparent, shining, finely striated, whorls 4½ or 5; umbilicus large, exposing the second whorl; aperture roundish.

Helix lucida. *Drap.* 103. t. 8. f. 11, 12. (not *Montagu*); *Brard,* 34. t. 2. f. 3, 4.; *Gray, Med. Repos.* 1821. 239.; *Turton, Man.* ed. 1. 56. f. 38. (not 40.).

Helix nitida. *Müller*, *Verm.*; *Alder*, *Mag. Zool. & Bot.* ii. 107.

Helix tenuis. *Dillwyn*.

Inhab. moist ditches and marshy places.

Animal black or blackish grey; foot and lower side of body grey; tentacles and neck black. (*Sturm*, t. 11.)

The shell appears dark chocolate when the animal is alive, and is about a quarter of an inch in diameter. It differs from Z. *cellaria*, Z. *alliaria*, and Z. *nitidula*, in being more convex, more regularly striated, of a darker colour, and without any trace of opacity on the under side.

Nilson describes the eggs as depressed, globose, covered with a white calcareous shell. They are solitary, and deposited in May or June. This snail is sometimes so abundant in pine-beds and orchidæa-houses as to be a great detriment to the plant; hence they have been called *Pine Snails* and *Orchideous Snails*.

54. 11. Zonites *excavatus*. Excavated Snail. (t. 4. f. 39.*) Shell sub-globular, depressed, shining, transparent horn-colour, regularly striated; whorls 5½ or 6, rather rounded and closely set; base much rounded, umbilicus very large and deep, exposing all the whorls to the tip; aperture nearly orbicular lunate.

Helix excavata. *Bean*, *MSS.*; *Alder*, *Cat.* 13. n. 52.; *Mag. Zool. & Bot.* ii. 107.

Helix lucida var. *Turton*, *Man.* ed. 1. 57. t. 4. f. 39.

Helix nitida *a.* *Jeffreys*, *Linn. Trans.* xiii. 339 511.

* This has been designated as Z. alliarius
See No. 48 p. 156
Should it be fig 49

Inhab. under decayed wood, and timber that has lain some time on the ground.

Animal lead-coloured.

Shell about one quarter of an inch in diameter; it very much resembles *Z. lucida*, but may be distinguished from it by its greater convexity both above and below, and by its peculiarly large umbilicus; the whorls are also rather more convex and more closely set, and the outer whorl is not so large in proportion to the rest; the striæ are rather stronger, the animal lighter coloured, and it frequents a different situation. The Shell varies in being paler.

55. 12. ZONITES *crystallinus*. Crystalline Snail. (t. 4. f. 42.) Shell flat, glossy, of a greenish crystalline transparency, with six very gradually increasing volutions; aperture semilunate; umbilicus small.

Helix vitrea. *Brown.*

—— crystallina. *Drap.* p. 118. t. 8. f. 13—18. *Gray, Med. Rep.* 1821. 239.; *Alder, Cat.* 108.; *Turton, Man.* ed. 1. 58. f. 42.; *Jeffreys, Linn. Trans.* xiii. 341. 511.

Zonites crystallina. *Leach, Mollusc.* p. 105.

Var. Helix hyalina. *Férus. Tab. Moll.* 224.?; *Alder, Cat.* 108.

In wet meadows, among moss and leaves.

Animal milky white; neck long, tentacles, dark long, very active.

Shell, when enclosing the animal, very shining white, fulvous on the spire, hardly the eighth of an inch in diameter, flat above and a little convex beneath, with six volutions, which enlarge gradually from the centre; of a crystalline or watery transparency with a slight tinge of green; aperture crescent-shaped; umbilicus deep and rather large.

It may be known from the young of any of the former species by its watery transparency, and by the number and regularity of its volutions, which increase in a gradual proportion, not having the outer one much larger than the rest.

This common shell was first recorded as British in the *Medical Repository* for 1821.

6. SUCCINEA *Drap.* (Amber Snail.)

The animal with a large gelatinous foot, short inflated tentacles, and an oblong spiral body, lying on the upper part of the foot; body covered with an oval, oblong, thin shell, with a short conical spire, and rapidly enlarging whorls, ending in a large longitudnal oblique mouth, with the peristome disunited behind; pillar smooth, and with an imperforated axis.

This genus is easily known from Helix and Zonites by the oblong shape; and from *Limnæus*, with which the older conchologists often confounded it, by there being no appearance of any oblique fold on the pillar.

Montagu justly observes that the animal, like the other *Limaces* possessing four tentacula, is hermaphrodite, and sometimes unites as late as the month of August. (*Test. Brit.* 398., and *Sup.* 139.)

If is named from the transparent amber colour of its shell.

They are found in damp marshy places on the mud, water-flags, &c., but are scarcely to be considered as amphibious, for they are never found in the water, like the *Limnæi* or Pond snails.

They sometimes form a thin membranaceous transparent epiphragm. Potiez describes a French species, very probably only a variety of *S. oblonga*, under the name of *S. arenaria*, which he says buries itself in the sand during the dry weather.

56. 1. SUCCINEA *putris*. Common Amber Snail. (t. 4. f. 73.) Shell oblong-oval, smooth, glossy and transparent, reddish amber-colour; whorls three; aperture oblong-oval.

Turbo tri-anfractus. *Da Costa*, 92.
Succinea amphibia. *Drap. Hist. Moll.* 58. t. 3. f. 22, 23.; *Lam. H.* vi. 135.; *Brard*, p. 72. t. 3. f. 1.; *Sowerby*, *Gen.* f. 3.; *Turt. Man.* ed. 1. p. 91.
Succinea Mülleri. "*Leach*, *Mollusc.* p. 78."
——— putris. *Flem.; Jeffreys*, *Linn. Trans.* xvi. 325. 505.
Helix putris. *Linn. S. N.* 1. 1249.; *Mont.* p. 376. t. 16. f. 14.
Helix succinea. *Müller*, *V.* ii. 97.; *Turt. Dict.* p. 67.
—— limosa. *Dillwyn*, p. 965.
Bulimus succineus. *Brug.*
Cochlohydra putris. *Fér.*
Limnea succinea. *Flem.*
Tapada putris. *Studer.*

In marshes, on aquatic plants, in most parts of England.

Animal grey, spotted; tentacles rugose.

Shell, when containing the animal, blue-black; about three quarters of an inch long, and half as much broad, of a greenish, amber or orange-yellow colour, very thin and transparent; spire composed of three volutions, the first extremely large and inclining a little obliquely; the two upper ones very small, and ending rather obtusely; aperture covering three fourths of the shell; pillar spiral, visible internally to the end or apex.

Dr. Fleming observes, "A variety of this shell sometimes occurs with a thickened expanded subreflexed white lip." (*Brit. Anim.* 267.) I think this must be a mistake, and should have been a remark appended to *Limnæus pereger*: it was probably copied from *H. putris* of Maton and Racket, which is the latter species! (See *Linn. Trans.* viii. 229., and *Mont. Test. Brit. Sup.* 139.)

57. 2. SUCCINEA *Pfeifferi.* Slender Amber Snail. (t. 4. f. 74.) Shell oblong, slender, transparent, shining, internally pearly; mouth very large, elongate-acute, very oblique; outer lip thin.

Succinea putris. var *a.* *Jeffreys, Linn. Trans.* xvi. 325. 505.
Succinea amphibia *b.* *Pfeiffer,* 67. t. 3. f. 37.
——— oblonga. *Leach, Moll. MSS.*; *Turton, Man.* ed. 1. t. 4. f. 74.; *Alder, Cat.* 6. n. 20. (not *Drap.*).
Succinea amphibia *β.* *Nilson,* 41.
——————— γ and δ; *Drap. Mollusc.* f. 23.
Succinea Pfeifferi. *Rossm. Icon.* t. 92. f. 46.
——— intermedia. *Bean, MSS.*
——— gracilis. *Alder, Mag. Zool. & Bot.* ii. 106.; *Johnst. Berw. N. H. Club,* 1838.
Succinea Levantina. *Desh. Lam. Hist.* vi. ed. 2. 317.?

Inhabit banks of rivers and streams, — common.

Very like the former, but is smaller, narrower, with a shorter spire, and a more oblique, oblong, larger mouth. It is very doubtful if this is more than a variety of that variable species.

Mr. Alder observes, "It may require further investigation to decide whether or not this be really distinct from *S. putris*. I have found them plentiful within 100 yards of each other, each retaining its characteristic marks in the colour of the animal and shape of the shell, and unmixed with the other sorts. Some foreign species of this difficult genus, quite as nearly allied as this to *S. putris*, are nevertheless considered to be distinct."

58. 3. Succinea *oblonga*. Oblong Amber Snail. (t. — f. 139.) Shell oval, rather ventricose, slightly striate, reddish horn-colour; whorls three or four, produced; suture distinct; aperture oval.

Succinea oblonga. *Drap.* p. 59. t. 3. f. 24, 25.; *Jeffreys*, *Linn. Trans.* xvi. 325. 505.; *Alder*, *Mag. Zool. & Bot.* ii. 106.

Inhab. edge of ditches, — Britonferry, near Swansea (*Jeffreys*), Bathgate, near Glasgow (*Kenyon*).

Animal black-grey; tentacles nearly conical.

Shell small, like *Limnæus fossarius* in shape; the spire conical, produced, as long as the mouth.

This is probably the small variety indicated by Dr. Johnston, as about 3-10ths of an inch long; it is common in Berwickshire. "It seems to be," he adds, "a perfect shell, and in the places where it abounds, the larger shell is not found." (*Berwick N. Hist. Club*, p. 154.)

7. Bulimus. (Twist Shell.)

The animal is moderately large (like the snails), with four tentacles, a small elongate foot, and a long central, slender, spiral body, covered with an oblong shell; the spire produced and ending rather acutely, with the ultimate volution larger than the next; aperture oval, entire at the base, without teeth, not half as long as the spire; the peristome interrupted; outer lip generally thickened, reflexed.

The shell of this genus is distinguished from that of *Limnæus* in wanting the oblique fold on the pillar; from the *Clausiliæ* in being regular, and in having the peristome simple and interrupted; and from the *Pupæ* in having the spire regularly tapering.

The animal of this genus (and of *Pupa* according to M. Deshayes) is distinguished from the snail (*Helix*) in being destitute of any *vesicula multifida.*

Probably called *Bulimus* from their eagerness to feed on vegetable substances.

Hartmann, and since him Mr. Broderip, have changed the name of this genus to *Bulinus,* thinking probably that it was derived from the *Bulin* of Adanson, but that is an *Aplexus.*

They may be divided into two sections.

a. Ena *Leach.*

Shell ovate, whorls gradually enlarging, covered with a brown periostraca; peristome thickened, reflexed.

59. 1. Bulimus *Lackamensis.* Wiltshire Twist Shell. (t. 6. f. 62.) Shell conic-oblong, reddish brown, obliquely striolate; the peristome reflected and forming an umbilicus.

Helix Lackamensis. *Mont.* p. 394. t. 11. f. 3.

——— buccinata. *V. Alten, E. & F. Conch.* 100. t. 12. f. 22.

Bulimus Montacutus. *Jeffreys, Linn. Trans.* xvi. 345.

Bulimus obscurus. *Hartmann.*

———— montanus. *Drap.* p. 74. t. 4. f. 22.; *Turton, Man.* ed. 1. 80. f. 62.; *Sturm, Fauna,* vi. t. 6.; *Pfeiffer,* 52. t. 2. f. 10.

Ena montana. *Leach, Mollusc.* p. 112.

In moist beech woods, among decayed leaves, and on the bark of trees.

Animal pale; tantacles club-shaped. (*Mont., Sturm.*)

Shell five eighths of an inch long, and a quarter of an inch wide, deep chocolate-brown varying to light grey, conically elongated; spire consisting of seven slightly raised but well-defined volutions ending in a rather acute point, irregularly and obliquely striate longitudinally, and when magnified having the appearance of a shagreen-like roughness; aperture oblong-oval, with the peristome chocolate-brown and reflected, forming an umbilicus behind the pillar.

The shell varies considerably in size and ventricoseness; also in colour, being sometimes whitish horn-colour, and semitransparent, arising, as in other varieties of the kind, from a disordered state of the animal, preventing the secretion of the colouring and chalky matter.

This species, though not uncommon on the Continent, appears to have been first described by Colonel Montagu, who received it from the south of England.

It appears to grow slowly, for Montagu observes, that scarcely one in ten of the shells he found had their mouths perfected; when young the shell, as in the next, is short, conic, and trochus-like, with a sub-quadrangular mouth. (*T. B.* 395.)

60. 2. Bulimus *obscurus*. Dusky Twist Shell. (t. 6. f. 63.) Shell oval-oblong, brown, with the peristome white and reflected, forming a small umbilicus.

Helix obscura. *Müller, Verm.* 103.; *Montagu,* p. 391. t. 22. f. 5.

Turbo rupium. *Da Costa,* p. 90.; *List. Ang.* t. 2. f. 8.

Bulimus hordeaceus. *Brug. E. M.* 334.; *Lam.*

——— obscurus. *Drap.* p. 74. t. 4. f. 23.; *Brard,* p. 97. t. 3. f. 19.; *Turton, Man.* ed. 1. 81. f. 63.; *Jeffreys, L. T.* xvi. 343.

Ena obscura. *Leach, Mollusc.* p. 113.

In woods and old walls, under stones or moss

Animal rosy grey; foot thick, paler; upper tentacles subulate.

Shell half an inch long, and about a third as much broad, brown or horn-colour, semitransparent; spire composed of six or seven raised volutions, slightly striate longitudinally; aperture oblong-oval, with the margin white and reflected, forming a slight umbilicus behind the pillar. The young shell conical, pyramidical, with a subquadrangular mouth.

Except in size, it is not easy to form a very distinctive character between this and the last species; but this is of a paler brown, with the volutions more rounded, and the peristome is white.

Varies like the last, and being more common, the varieties are more often observed.

Montagu thought the young shell was the *Helix ventricosa* of Müller.

The Rev. Mr. Sheppard remarks — "These shells, particularly in their young state, show great sagacity and ingenuity, by covering themselves with a coat adapted to the different situations in which they are found; and when so covered, it is almost impossible for any other than a conchological eye to discover them. If its abode be upon the trunk of a tree covered with *lichen*, then is the epidermis so constructed as to cause the shell to resemble a little knot on the bark covered with such substance. If on a smooth tree, from whose bark issue small sessile buds, as is frequently the case, it will pass off very well for one of them; and on a dry bank, or the lower part of the body of a tree splashed with mud, its appearance will be that of a misshaped pointed piece of dirt." (*Linn. Trans.* xvi. 166.)

Dr. Turton, in the first edition of this work, introduced *Bulimus decollatus* (p. 77. f. 60.) and *Bulimus clavulus* (p. 79. f. 61.); but they cannot be considered as even naturalised or acclimatised, for they are only found in hot-houses, warmed with artificial heat. He also described *B. tuberculatus* (p. 81. f. 64.), a Sicilian species (*B. pupa* Brug.), which he introduced on the authority of Captain Blomer, who appears to have given him by mistake, most probably, two or three Sicilian shells as British. (See *Introduction*, p. 11. and 16.)

b. Elisma *Leach.*

Shell turreted, white, banded, covered with a thin periostraca; whorls rapidly and regularly enlarging; mouth small; peristome thin, scarcely reflexed.

61. 3. Bulimus *acutus.* Banded Twist Shell. (t. 6. f. 67.) Shell oblong, rather acute, coarsely wrinkled or striate, generally whitish, with brown streaks or bands.

Elisma fasciata. *Leach, Mollusc.* p. 109.
Bulimus acutus. *Brug. E. M.* 42.; *Drap.* p. 77. t. 4. f. 29, 30.; *Jeffreys, Linn. Trans.* xvi. 346.
Turbo fasciatus. *Pennant, B. Z.* i. 31. t. 8. f. 119.; *Mont.* p. 346. t. 22. f. 1.
Helix bifasciata. *Pulteney,* 49.; *Linn. Trans.* viii. 210.; *Turton, Dict.* p. 63.
Helix acuta. *Müller, Verm.* 110.; *Dillwyn,* p. 956.
Lymnæa fasciata. *Flem. Ed. Ency.*
Bulimus fasciatus. *Turton, Man.* ed. 1. t. 84. f. 67.
——— ventricosus. *Turton, Man.* ed. 1. t. 84. f. 69.
Bulimus variabilis. *Hartmann;* not *Synon.*
——— articulatus. *Drap.* (not *Turton, Man.* ed. 1.).

On sandy maritime pastures, in the west of England and Wales, Ireland and Scotland.

Animal pale yellowish; upper tentacles long, subulate, lower very short.

Shell half an inch or rather more in length, and about a third as much broad, oblong, semitransparent, variously marked, but always coarsely wrinkled longitudinally, and sometimes of a greyish colour with white longitudinal streaks; spire consisting of from nine to twelve somewhat rounded volutions, ending rather acutely; aperture oval, longer than wide; the peristome reflected and forming a slight perforation at the pillar.

This shell varies very greatly in its colôur, being sometimes nearly white without bands, and at others variously banded; the hinder bands are often wanting or interrupted, and sometimes instead of being banded, the shell is marked with oblique longitudinal streaks, sometimes the black and sometimes the white being the more abundant, and consequently forming the ground colour. It varies slightly in shape, and is sometimes much elongated.

The *Bulimus ventricosus* of Draparnaud and other continental authors differs in being shorter, and all the whorls more pressed together and ventricose. I have never seen any specimens agreeing with this foreign species found in England, and believe that the specimen which Dr. Turton took for it was only one of the numerous varieties of *B. acutus*, as his figure does not represent the continental species.

Montagu (*Test. Brit.* 348.) erroneously thought this species, which has a very wide continental distribution, was peculiar to England. He thought the *H. acuta* of Gmelin was *Bulimus detritus*. (See p. 386.) In the places where it is found it is often so abundant that it is a prevailing opinion that they contribute much to the fattening of sheep. (See *Borlase*, *Hist. Corn.* 286.; *Mont. Test. Brit.* 347.) It is often found in company with *Helix virgata* (see *Test. Brit.* 417.), which is supposed to have the same qualities.

Mr. Alder most justly observes, that *B. articulatus* of Drap. is only a common variety of *B. acutus*. But the specimens of *B. articulatus* of Turton, which are now in the cabinet of Mr. Clark of Bath, according to the observations of Mr. Alder, are a very distinct species, not known, he believes, to inhabit Europe. Dr. Turton admits this species and *B. ventricosus* into the Fauna, as having been sent him "from the plains about Penzance in Cornwall," but without stating by whom they were found, or how transmitted to him.

The *Bulimus articulatus* of Turton (*Man.* ed. 1. p. 6. f. 68.), judging from the figure, is a West Indian species, named by Mr. Guilding *Macroceramus signatus*. (See p. 20. n. 5.)

8. Zua *Leach*. (Varnished Shell.)

Animal like Bulimus, with an ovate subcylindrical rather blunt shell, covered with a smooth polished periostraca; mouth ovate, thickened, and united all round; peristome toothless; axis imperforated.

This genus is easily known from *Bulimus* by the polished periostraca and continued, thickened, not reflexed lip; and from *Azeca* by the simple peristome.

Mr. Jeffreys has established a genus under the name of *Cionella* for this species and *Achatina acicula;* but these shells appear to have no natural alliance to one another, and the characters given to the genus are hardly such as could distinguish a species.

62. 1. **Zua** *lubrica.* Common Varnished Shell. (t. 6. f. 65.) Shell cylindrical-oblong, quite smooth, glossy, and semitransparent; the peristome thick, without umbilicus.

Bulimus lubricus. *Brug.; Drap.* p. 75. t. 4. f. 24.; *Brard*, p. 98. t. 3. f. 20.; *Pfeiffer*, 50. t. 3. f. 7.; *Turton, Man.* ed. 1. 82. f. 65. Gould, 193.
Cionella lubrica. *Jeffreys, Linn. Trans.* xvi. 347.
Zua lubrica. *Leach, Moll.* p. 114.
Helix lubrica. *Müller, Verm.* 104.; *Mont.* p. 390. t. 22. f. 6.
Helix subcylindrica. *Linn.* (?); *Dillwyn*, p. 952.
Turbo glaber. *Da Costa*, p. 87. t. 5. f. 18.
Achatina lubrica. *Mich.; Férussac; Alder, Mag. Zool. & Bot.* ii. 110.
Cochlicopa lubrica. *Férus.; Risso.*
Lymnæa lubrica. *Flem. Ed. Ency.*

Under stones and among moss and grass on the ground.

Animal shining black, brown or blackish grey above, paler beneath; tentacles black, lower very small. (*Sturm.*)

Shell hardly a quarter of an inch long, and a third of its length broad, of a glossy brown or horn-colour, with often a reddish tinge, quite smooth and polished; spire composed of five or six raised volutions; aperture narrow-oval, with the margin thick and not reflected, often of a rosy colour.

Varies in shape, size, and colour, sometimes transparent greenish white.

This species was first figured as English by Lister (*Anim. Ang.* t. 2. f. 7.) and Petiver (*Gaz.* t. 30. f. 7.).

9. Azeca *Leach.* (Trident Shell.)

Animal like Bulimus, with subcylindrical, rather obtuse shell, covered with a polished periostraca; aperture pear-shaped, curved and pointed at the top; the margin thick, obtuse, and united all round and toothed; the axis imperforated.

In shape, colour, polish and habitat, this shell so exactly resembles the *Bulimus lubricus*, that some have questioned if this latter shell be not the same in its earlier stage of formation before the teeth appear; but the singular shape of the aperture decidedly removes it into a distinct genus, which is adopted from Dr. Leach.

Mr. Alder considers this genus as intermediate between *Bulimus* and *Clausilia*, resembling the former in shape, and approaching more to the latter in having the peristome complete, and also more particularly in having a longitudinal plate on the columella, considerably within the aperture, similar in situation and making a slight approach in form to the *Clausium* of the genus *Clausilia*, though attached through its whole length, and inflexible.

63. 1. Azeca *tridens.* Glossy Trident Shell. (t. 5. f. 52.)

Turbo tridens. *Montagu,* p. 338. t. 11. f. 2.; *Laskey, Wern. Soc.* i. p. 406. t. 8. f. 11.

Pupa Goodalli. *Férussac, Prod.* 71.

—— Britannica. *Kenyon, Mag. N. H.* ii. 426. f. n.

Azeca tridens. *Leach, Moll.* p. 122. t. 8. f. 8.; *Alder, Cat.* 32.

Azeca Goodalli. *Fér.; Alder, Mag. Zool. & Bot.* ii. 110.

Azeca Matoni. *Turton, Man.* ed. 1. 68. f. 32.

Carychium Menkeanum. *Pfeiffer*, 70. t. 3. f. 42.

In woods, damp closes, under moss, among decayed leaves, and in thick shady places.

Animal brownish black, shining; upper tentacles cylindrical, club-shaped.

Shell two tenths of an inch long, and a third part as broad, oblong or conico-cylindrical, brown horn-colour, semitransparent, quite smooth and glossy, except close to the sutures, where there appear some fine longitudinal striæ; spire composed of seven flat and hardly raised volutions; aperture pear-shaped, curved, and narrower at the upper and outer angle; the peristome thickened and obtuse.

This shell varies in shape, size, and colour, being sometimes transparent greenish white, from want of substance and colouring matter. It also varies in having one or two additional small teeth in the peristome alternately with the larger ones.

10 Achatina *Lam.* (Agate Shell.)

Animal like Bulimus, with four tentacles and an oval-oblong, or somewhat cylindrical shell, obtuse at the tip; aperture longitudinal, oval; the outer lip thin, without any internal rib, and never reflected; pillar smooth, simple, truncate in front.

The abruptly truncated termination of the pillar or inner lip of the shell will immediately distinguish this genus from *Bulimus*, to which it is in other characters so nearly allied. The only British species forms a very distinct section, perhaps genus, from the larger exotic kinds.

a. ACICULA *Nilson.*

* *The shell turreted, polished, transparent; mouth oblong, rather narrow; upper tentacles subulate, blunt, eyeless.*

64. 1. ACHATINA *Acicula.* Needle Agate Shell.
6-71 (t.~~8. f. 77.~~) Shell slender, smooth, polished, white, with sixflat volutions; the lower one as long as all the others; mouth elliptical.

Achatina Acicula. *Lam.* vi. p. 133.
Bulimus Acicula. *Brug. E. M.* 22.; *Drap.* p. 75. t. 4. f. 25, 26.; *Brard,* p. 100. t. 3. f. 21.
Buccinum terrestre. *Mont.* p. 248. t. 8. f. 3.
——— Acicula. *Müller, Verm.* ii. 150.; *Dillwyn,* p. 652.
Helix octona. *Gmel. S. N.* i. 3653.
Cionella Acicula. *Jeffreys, Linn. Trans.* xvi. 348.

Among the roots of trees, at the base of limestone rocks.

Animal pellucid white, granulately striated; tentacula retractile, cylindrical, upper pair longest, granular, not thickened at the top, smooth, convexly truncated, without any black spot (eyes); lower pair opposite the angles of the mouth; foot compressed, pointed behind; breathing-hole large, rounded, in the middle of the outer lip of the shell.

Shell not a quarter of an inch long, taper; aperture oval-oblong, appearing as if cut off at the base, giving the end of the pillar the resemblance of a tooth; the outer margin thin, not reflected, nor forming an umbilicus.

This common species was first noticed as British by Mr. Boys (fig. 61.), and his figure 89. appears to represent the young shell. It is very common, six or eight inches deep in the ground, in Yorkshire, on the tops of gravel pits, and in Saxon coffins.

The animal, from the transparency of the shell, may be seen to dilate and contract its respiratory cavity through the shell. This motion has been taken for the beating of the heart; it is irregular sometimes fast and sometimes slow.

The eggs are large compared to the size of the shell; and this explains the bluntness of the apex, arising from the large size of the body of the animal, on which the shell is formed before it is hatched.

Pfeiffer, in his delineation of this shell (part 1. tab. 3. fig. 8, 9.), has erroneously exhibited the aperture as quite rounded at the base, without the least truncation of the pillar, thereby fixing it in the genus *Bulimus.*

11. PUPA *Lam.* (Chrysalis Shell.)

Animal like Bulimus, with four club-shaped tentacles, the lower pair short, small, and with a cylindrical abruptly obtuse shell, with close pressed, gradually enlarging whorls; the mouth semi-oval, mostly toothed internally; peristome reflexed, and interrupted behind.

The young shells have a flattened front to the whorls, and a squarish mouth, so that they were mistaken by some of the older conchologists for *Trochi;* the older whorls are more convex and rounded in front, and the animal does not form the reflexed lip until it has arrived at maturity; consequently, like the *Clausiliæ* among land shells, and the *Strombi* and *Cypræœ* among marine ones, it only forms the complete mouth to its shell once in its life. (See *Phil. Trans.* 1833.)

These shells are called Pupa, Puppet, or Doll, because they resemble children in their swaddling-clothes.

* Lauria *Gray.*

Peristome margined, reflexed; the young shell with a transverse series of short triangular plates.

Mr. Alder has observed that *Pupa umbilicata* and *P. anglica* have a very curious and elaborate internal structure. They have a raised thread-like lamina, running spirally round the columella in the manner of a corkscrew, and another similar lamina running spirally in the centre of the upper side of the whorls; and there are set at short distances small flat testaceous plates similar in situation to the septa in *Nautilus lacustris.* This complicated structure is, no doubt, intended to answer some useful purpose in the economy of the animal; but what is its use besides the protection of the animal in a young state, he has not been able to discover. It is not continued through the lower whorls, and is most distinctly seen in the young shells. This structure is not found in the young of *Pupa marginata*, *P. edentula*, and *P. sexdentata.*

65. 1. Pupa *umbilicata.* Umbilicated Chrysalis Shell. (t. 7. f. 78.) Shell cylindrical, bald, smooth, brownish; whorls five to seven; mouth elongate lunate, with a single laminar tooth

united to the upper angle of the outer lip; peristome with a white flat reflected margin; umbilicus narrow.

Pupa umbilicata. *Drap.* p. 62. t. 3. f. 39, 40.; *Jeffreys, Linn. Trans.* xvi. 357.; *Rossm.* t. 23. f. 327.
Pupilla Draparnaudii. *Leach, Mollusc.* p. 126.
Turbo muscorum. *Mont.* p. 335. t. 22. f. 3.; *Linn. Trans.* viii. 182.
Turbo cylindraceus. *Da Costa,* p. 89. t. 5. f. 16.
Bulimus muscorum. *Brug.*
Odostomia muscorum. *Flem. Ed. Ency.*
Jaminia muscorum. *Risso, E. M.* iv. p. 88.
Var. edentula. Mouth without teeth.

Under stones, in clefts of old walls, and under the bark of trees, in shady places. Common in England and Scotland.

Animal granular, head and tentacles black, lower very small; foot whitish. (*Michaud.*)

Shell two lines long, dark horn-colour, glossy and semitransparent; spire composed of six rounded volutions finely striate longitudinally; aperture roundish-oval, with a broad, flat glossy white margin, and a single tooth which is parallel with the margin and close to the outer lip, appearing like a curved continuation of the margin itself; pillar with a large deep perforation behind it.

This does not appear to be the *Turbo muscorum* of Linnæus, who describes it as having no tooth in the aperture, "apertura edentula;" and no where mentions the remarkable broad white margin.

Mr. Alder, on breaking some of these shells, found them to contain (ten or twelve) young shells with the first whorl of the shell formed. This would lead to the conclusion that the animal is viviparous. The same has been observed to be the case with several other terrestrial shells, as *Bulimus decollatus*, *Achatina octona*, and some *Carocollæ*, as *C. bicolor*.

66. 2. PUPA *anglica*. English Chrysalis Shell. (t. 7. f. 82.) Shell ventricose, shining, bald, fulvous; whorls five; aperture elongate-lunate, five-toothed; the peristome flattened and reflected; umbilicus cylindrical.

Vertigo anglica. *Férussac, Mollusc.; Turton, Man.* ed. 1. f. 82.

Pupa tridentalis. *Michaud, Compl.* 61. t. 15. f. 28. 30. ?

Pupa anglica. *Potiez and Michaud, Gall.* i. 195. t. 20. f. 1. 2.

Turbo anglicus. *Wood, Cat. Supp.* t. 6. f. n.

Pupa ringens. *Jeffreys, Linn. Trans.* xvi. 356.

—— bidentata. *Pfeiffer*, i. 59. t. 3. f. 21, 22.

Inhab. woods, north of England, Northumberland, Lancashire.

Animal dark lead-coloured, white beneath.

Shell two lines long, and half as much broad, dark chocolate-brown with often a greyish cast, especially towards the point, opake, faintly striate longitudinally; spire composed of six or seven slightly raised volutions; aperture semielliptic, with a tubercular projection near the top of the outer lip, and five teeth, two at the base, one of them small and tubercular, one central at the top, one at the top of the outer angle, parallel with and united to the peristome, curving so as nearly to meet the marginal tubercle, and form a circular enclosure; and an oblique one on the pillar; peristome flat, brown, reflected, with a strong umbilicus behind the pillar.

b PUPILLA *Leach.*

Peristome with a strong external rib, and a single tooth in the hinder part of the mouth; young shell with a simple cavity.

67. 3. PUPA *marginata.* Margined Chrysalis Shell. (t. 7. f. 79.) Shell cylindrical, bald, shining brown; whorls five to seven, convex; mouth roundish lunate, with a single minute interior central tooth, and a strong white external rib behind the outer lip.

Pupa marginata. *Drap.* p. 61. t. 3. f. 36. 38.; *Pfeiffer*, 59. t. 3. f. 23. 24.; *Brard*, p. 93. t. 3. f. 15, 16.; *Jeffreys*, *Linn. Trans.* xvi. 358.; *Turton*, *Man.* ed. 1. 98. f. 79.

Pupilla marginata. *Leach*, *Mollusc.* p. 127.

Turbo chrysalis. *Turt. Dict.* p. 220.

Pupa muscorum. *Lam.*

Helix muscorum. *Müller*, *Verm.* 105.; *Férus.*

Alæa marginata. *Jeffreys*, *Linn. Trans.* xvi. 357.

Jaminia marginata. *Risso*, iv. 89.

Pupa muscorum. *Pfeiffer*, iii. 61.?; *Rossm.* i. 83. t. 2. f. 37. and 323.

Turbo marginata. *Sheppard*, *Linn. Trans.* xiv. 154.; not *Brown.*

Var. 1. Mouth with the tooth obliterated.

Under stones, in dry pastures, and moist open places. Animal grey-black.

Shell the tenth of an inch long, brown or yellowish horn-colour; spire composed of six or seven rounded and slightly striate volutions; aperture semicircular, with generally a small tubercular tooth

placed in the middle and deep within the mouth, but which is sometimes very obscure and often totally wanting; peristome thin, not margined, but slighty reflected and forming an umbilicus; and behind the outer lip is a thick white rounded rib.

This species varies very much in size, and in the compactness of the spire.

Captain Brown has added to the list *Pupa unidentata* Pfeiffer (*Brown*, *B. S.* t. 41. f. 4.) and *P. bidentata* Pfeiffer (*Brown*, *B. S.* t. 41. f. 6.). According to Rossmäsler (i. 83.), these species of Pfeiffer are only varieties of *P. marginata.* Brown's figures are so bad that it is not possible to determine what species they are intended to represent.

ABIDA *Leach.*

Peristome slightly reflexed; throat many-plaited; cavity of the young shell simple.

68. 4. PUPA *juniperi.* Juniper Chrysalis Shell. (t. 7. f. 81.) Shell cylindrical, attenuated at the tip, brown, striated; aperture with seven or eight laminar teeth; the peristome acute and slightly reflected.

Turbo juniperi. *Montagu*, p. 340. t. 12. f. 12.

Pupa secale. *Drap.* p. 64. t. 3. f. 49, 50.; *Pfeiffer*, 55. t. 3. f. 14.; *Jeffreys*, *L. T.* xvi. 353.; *Rossm. Icon.* p. 82. t. 2. f. 35.

Abida secale. *Leach*, *Mollusc.* p. 165.

Vertigo secale. *Turton*, *Man.* ed. 1. 101. t. 7. f. 81.

Chondrus secale *a. Hartmann*, 218. n. 20.; *Sturm*, vi. 7. t. 4.

Torquilla secale. *Studer*, *Cat.* 19.

Cochlodonta secale. *Fér. Prod.* 64.

Inhab. roots of trees and under stones, in chalky districts, and cracks in rocks in oolite limestone.

Animal blackish brown, warty, foot slender.

Shell a quarter of an inch or rather more in length, of a greyish brown colour, opake, obliquely striate longitudinally; spire composed of eight or nine rounded volutions; aperture with seven or eight laminar teeth, two on the pillar lip; three on the outer lip, including the central one, all of which are visible on the back in the appearance of three pale bands; and two on the interrupted part of the peristome, the outer one of which is more prominent and close to the margin, with often a tubercle on its outside.

The shell of the young animal is clothed with an earthy covering, like *Bulimus obscurus.* In this state it is described by Müller, according to Jeffreys, under the name of *Helix ventricosa.*

Montagu (*T. B.* 340.) truly observes, that "these projections, usually called teeth, are not properly denticles or tooth-shaped protuberances, but are fine white *laminæ* or ridges running spirally backwards in a parallel direction to each other; those on the exterior lip may in most instances be traced through the outside of the shell," they are in fact foldings in of the substance of the shell, caused by some withdrawing of the mantle of the animal in the part immediately in connection with them; this is also the case with many of the foreign "toothed" Helices (*Helicodontæ*). The true teeth must be formed nearly in the same way, but they are produced by repeated deposits of layers of calcareous matter, one over the other, to fill up the cavity as the mantle is withdrawn: while these plaits are produced by a sudden contraction of the part which forms a mould for the newly deposited portion of the shell.

12. Vertigo *Müller*. (Whorl Shell.)

The animal, like *Bulimus*, with only two elongate clavate tentacles, the lower pair being wanting or rudimentary, and with a subcylindrical, abruptly obtuse shell, with close pressed, gradually enlarging whorls; the mouth contracted, more or less angular, generally toothed internally, and thickened by an exterior rib; peristome simple.

This genus has a shell very like the *Pupæ*, but was separated from them by Müller; and his division has been adopted by most succeeding zoologists, because the animal has the upper pair only of tentacles, which bear the eyes, developed.

a. Isthmia *Gray*. (Alæa *Jeffreys.*)

Shell dextral, cylindrical; mouth margined externally.

69. 1. Vertigo *edentula*. Toothless Whorl Shell. (t. 7. f. 80.) Shell conic-oval, ventricose, brown, with five or six volutions; aperture semicircular, without any tooth; the peristome simple, without margin or rib; umbilicus minute.

Pupa edentula. *Drap.* p. 59. t. 3. f. 28, 29.; *Pfeiffer; Alder, Mag. Zool. & Bot.* ii. 112.; *Turton, Man.* ed. 1. 99. t. 7. f. 80.

Turbo Offtonensis. *Sheppard, Linn. Trans.* xiv. 155.?

Vertigo nitida. *Férus. Tab. Moll.* 64.

Alæa nitida. *Jeffreys, Linn. Trans.* xvi. 358. 515.

Turbo muscorum var. *Montagu, T. B.* 356.
Jaminia edentula. *Risso,* iv. 89.
Alæa revoluta. *Jeffreys, Linn. Trans.* xvi. 515. 558.
Turbo edentulus. *Wood, Cat. Suppl.* t. 6. f. 14.
Var. Shell more elongated and cylindrical.

Marshy places, at the roots of grass, under stones and on trees.

Animal grey; upper tentacles clavate.

Shell the tenth of an inch long, horn-colour, transparent, slightly striate; spire composed of five or six rounded and deeply divided volutions; aperture with a very thin margin, without the rib behind the outer lip.

The young shells are very transparent light horn-colour, and brittle; the apex of the adult shell is often whitish and slightly eroded.

Montagu was acquainted with this shell, but had not fixed it as a distinct species.

It is very probable that this is the true *Turbo muscorum* of Linnæus, as it most accurately answers his definition in the *Systema Naturæ.* "Testa ovata obtusa pellucida, anfractibus senis secundis, apertura edentula."

Mr. Jeffreys, in his Supplement, observes, "The *Alæa revoluta* of his Synopsis is an old bleached specimen, with the aperture placed more extrinsecally than usual." (*Linn. Trans.* xvi. 515.)

70. 2. VERTIGO *cylindrica.* Cylindrical Whorl Shell. 12 - 1150. (t. ~~140. f. 10.~~) Shell attenuated, pellucid, pale brown, acutely obliquely striated; whorls five, convex; mouth ovate, slightly margined externally, toothless; umbilicus narrow.

Pupa obtusa. *Flem. Brit. Anim.* 269.; not *Drap.*

Alæa cylindrica. *Jeffreys*, *Linn. Trans.* xvi. 359. 515.

Vertigo cylindrica. *Férussac*, *Tab. Moll.* 64.; *Alder*, *Mag. Zool. & Bot.* ii. 112.

Pupa muscorum var. *a.* *Drap. Hist. Moll.* 59. t. 3. f. 36, 37.

Pupa minutissima. *Hartmann*, *Neue Alpina*, 220. t. 2. f. 5.; *Pfeiffer*, iii. 38. t. 7. f. 12, 13.; *Rossm. Icon.* i. t. 2. f. 38. 84.

Pupa minuta. *V. Charpentier*, *MSS.*

Inhab. under stones on downs.

Animal blackish red, shining.

Dr. Fleming, who first described this shell, confounded it with *Pupa obtusa* of Drap., but he observed that it is not a line in length, while Draparnaud's shell is about half an inch; this has only five whorls, and his has eight. It was sent to Dr. Fleming by Mr. Chambers, surgeon, Kirkaldy, who found it in the parish of Balmenna, Fifeshire.

Mr. Forbes states, that this is the *Pupa obtusa* described by Dr. Fleming; for he has "a specimen which belonged to Captain Laskey, so labelled by himself." Mr. Jeffreys has referred it, as a synonym, to *Pupa alpestris.*

71. 3. VERTIGO *pygmæa.* Pygmy Whorl Shell. (t. 7. f. 83.) Shell egg-shaped, rather ventricose, bald, shining, reddish brown; whorls four or five; mouth orbicular lunate, with five teeth, one of which is superior and central between the lips of the peristome; the peristome acute, margined externally.

Vertigo vulgaris. *Leach*, *Mollusc.* p. 129.

Pupa pygmæa. *Drap.* p. 60. t. 3. f. 30, 31.

Vertigo pygmæa. *Férus. Tab. Moll.* 64.; *Turton, Man.* ed. 1. f. 83.; *Alder, Mag. Zool. & Bot.* ii. 112.

Helix Isthima cylindrica. *Gray, Med. Repos.* 1821. 239.

Turbo sexdentatus jun. *Montag. T. B.* 337.

Alæa vulgaris. *Jeffreys, Linn. Trans.* xvi. 359.

On dry barren hills, under stones.

Animal blackish grey; tentacles very short.

Shell a line long, dark brown, semitransparent; spire composed of five rounded and nearly smooth volutions; aperture somewhat triangular, with usually five teeth, two on each lip, and a central one on the upper part; peristome thin, whitish when the shell is perfect, slightly reflected and forming an umbilicus, with a longitudinal external rib on the outer lip.

72. 4. VERTIGO *alpestris*. Alpine Whorl Shell. (t. —XII. f. 141.) Shell cylindrical, pale horn-colour, transparent, striolate, with five whorls a little rounded; aperture semicircular, outer lip slightly bent and reflected; teeth four, situated as in *V. pygmæa.*

Vertigo alpestris. *Férussac, MSS.*; *Alder, Mag. Zool. & Bot.* ii. 112.

Inhab. old walls.

Differs from *V. pygmæa*, to which it is very like, in being more cylindrical and slightly striated. The shell is about one tenth of an inch long, half as broad.

73. 5. Vertigo *substriata*. Six-tooothed Whorl Shell. (t. 7. f. 84.) Shell subcylindrical, ventricose, shin-

ing, striated, yellow horn-colour; mouth orbicular lunate, rather sinuated, with two or three plaits on the pillar, and three on the outer lip.

Turbo sexdentatus. *Montagu, T. B.* t. 12. f. 8. ? ?; *Sheppard, Linn. Trans.* xiv. 156.
Vertigo 4-5-dentata. *Studer, Cat.*
——— similis. *Férussac, Prod.* 64.
Pupa sexdentata. *Alder.*
—— substriata. *Alder, Cat.*
Alæa substriata. *Jeffreys, Linn. Trans.* xvi. 315.
Vertigo substriata. *Alder, Cat. Supp.*, and *Mag. Zool. & Bot.* ii. 112.
Vertigo sexdentata. *Turton, Man.* ed. 1. t. 7. f. 84.
——— pygmæa. *Pfeiffer?*

Inhab. marshy places, at the roots of grass, and under stones; Suffolk, north of England, Preston, Newcastle.

Animal blackish grey.

Shell somewhat smaller than *V. pygmæa*, and of a more conical shape, with the volutions (four or five) more rounded and better defined; and may be readily known by the two distinct teeth on the surface between the two lips on the upper part of the aperture, the right tooth much the larger. The tip is mostly shining; mouth slightly margined externally; peristome thin, reflexed; perforation small.

The figure (84.) of the first edition, did not well represent this species, which is the smallest of the tribe; it has neither the striæ nor the more rounded whorls which distinguish it.

Dr. Turton refers Montagu's *T. 6-dentatus* to this species, Mr. Jeffreys refers it to *V. palustris.*

74. 6. VERTIGO *palustris*. Marsh Whorl Shell. (t. 7. f. 85.) Shell oval, ventricose, shining, brown, whorls five; aperture orbicular lunate; margins externally sinuated, with eight unequal teeth, three of which are superior and between the lips of the peristome.

Pupa antivertigo. *Drap.* p. 60. t. 3. f. 32, 33. ?
Vertigo palustris. *Leach, Mollusc.* p. 128. t. 8. f. 10.
Alæa palustris. *Jeffreys, Linn. Trans.* xvi. 360.
Vertigo Montagua. *Leach, MSS.*
Pupa muscorum. *Mont. T. B.* 337. t. 12. f. 8.?; *Maton and Racket, Linn. Trans.* viii. 183.; *Pulteney, Dorset.* 52. t. 19. f. 12.
Helix septemdentata. *Férus. Prod.*
Inhab. marshy situations.

Animal grey-black, and shining; upper tentacles short, inflated at the base, lower dot-like; front of head proboscis-like.

Shell smaller than the last, of a deep chestnut-brown colour, with the margin of the aperture whitish; teeth three above and three below, and one on each side, and often a ninth tubercular tooth.

It may easily be distinguished by the three very discernible white teeth of unequal size within the upper and truncated part of the aperture, whereas there is only a single central one apparently visible in the same position in *V. pygmæa*, and two in *V. substriata*. The mouth varies with from six to nine teeth.

Dr. Leach first described and named this species from some specimens which I found on Wimbledon Common in 1817, and presented to the Museum collection. It was first published as British by Férussac in his *Concordance*.

b. Vertigo *Müller.*

Shell cylindrical fusiform, sinistral; mouth margined externally.

75. 7. Vertigo *pusilla.* Wry-necked Whorl Shell. (t. 7. f. 86.) Shell ventricose, attenuated, bald, rather shining, very brittle, pale brown; whorls five; mouth subquadrate, rounded beneath; plaits six or seven, white, two or three on the column, and four on the lips; peristome thin; umbilicus rather narrow.

Vertigo pusilla. *Müller, Verm.* ii. 124.; *Alder, Mag. Zool. & Bot.* ii. 112.; *Jeffreys, Linn. Trans.* xvi. 361.

Jaminia heterostropha. *Risso,* iv. p. 91.

Vertigo heterostropha. *Leach, Mollusc.* p. 130.

Pupa Vertigo. *Drap.* p. 61. t. 3. f. 34, 35.

Inhab. moist woods, under stones.

Animal grey, paler beneath; foot slender.

Shell half a line long, pale chestnut-brown, semitransparent, striolate; spire composed of five much rounded volutions; aperture reversed, somewhat triangular, obliquely truncate, with the peristome thin, white, and slightly reflected, forming an umbilicus behind the pillar; behind the outer lip is a longitudinal rib, and two or three transverse pale lines, being the reflection of the internal teeth; teeth two above, and five round the mouth, with sometimes an eighth tooth on the pillar lip.

76. 8. Vertigo *angustior.* Narrow Whorl Shell. (t. . f. 142.) Shell ventricose, barrel-shaped,

pale fulvous, very slightly and sharply striated; whorls four or five, last broad; mouth sub-triangular; teeth four or five, two on the column and two or three on the outer lip; peristome rather thickened.

Turbo Vertigo. *Mont. Test. Brit.* 363. t. 12. f. 6.
Vertigo angustior. *Jeffreys, Linn. Trans.* xvi. 361.; *Alder, Mag. Zool. & Bot.* ii. 112.

Inhab. rejectamenta of a small stream at Marino, near Swansea.

Mr. Jeffreys observes, besides the very different contour and more contracted aperture of this shell, the circumstance of the back being more sunk in some specimens than in others, which peculiarity denotes the growth of dentate shells, sufficiently refutes the idea of its being the young of *V. pusilla.*

Mr. Alder observes, that the difference between this species and *V. pusilla* appears to be more in the number of the teeth than in the colour of the shell; and if the former is permanent, it is undoubtedly the better character of the two. He further remarks, "I have some doubt about this species: I examined Mr. Jeffreys' specimen, but could not satisfy myself of its distinctness from *V. pusilla:* I take it upon faith."

After considerable inquiries and correspondence, I have not been able to procure a specimen of this species, to examine or figure; and thence I cannot offer any opinion on the subject of its distinctness.

Captain Brown has added to the list *Pupa labiata* Brown, B. S. t. 41. f. 7.; but the figures are so indistinct that I cannot determine them.

13. Balæa. (Moss Shell.)

The animal is like Bulimus, but the shell is reversed, thin, with an elongated taper spire, the last volution larger than the next; aperture roundish-oval, entire at the base, oblique, with a single tooth on the pillar, which is wanting in the young shells, and the pillar is destitute of any valve-like plait or *clausium.*

This shell is often mistaken for a young unformed specimen of *Clausilia,* but it may be known from those shells by the front of the last whorl being convex and simple, and not flattened and furnished with a keeled ridge near the outer edge, as is the case with the young of all the species of that genus.

From *Bulimus* and *Pupa* this genus is distinguished by the aperture being left-handed; from *Clausilia,* in having the ultimate volution proportionately larger than the next; and from *Vertigo,* in the regularity of its mouth.

77. 1. Balæa *perversa.* Fragile Moss Shell. (t. 6. f. 70.) Shell rather linear-oval, transparent yellowish; whorls six or seven; mouth subquadrate.

Balæa fragilis. *Leach, Moll.* p. 116.; *Alder, Cat.* 8. 427.; *Mag. Zool. & Bot.* ii. 111.
Balea fragilis. *Gray, Zool. Journ.* i. p. 61.
Pupa fragilis. *Drap.* p. 68. t. 4. f. 4.
Turbo perversus. *Mont.* p. 335. t. 11. f. 12.
Balea perversa. *Flem. B. A.*
Odostomia perversa. *Flem. Ed. Ency.*
Clausilia fragilis. *Studer ; Jeffreys, Linn. Trans.* xvi. 351.

On the trunks of trees, under the bark, and imbedded in the lichen; also in the fissures of rocks.

Animal brownish yellow; neck black; foot grey, granular, spotted, narrow, and elongate; tentacles, upper thick, short, clavate; lower scarcely visible, very small, tubercular; muzzle very blunt and large.

Shell about a quarter of an inch long, slender, and tapering to a rather sharp point, transparent yellowish horn-colour, slightly striate longitudinally; spire consisting of from six to nine raised and well-defined volutions; aperture roundish-oval; the peristome thin, simple and a little reflected at the pillar so as to form a slight umbilicus. In old and full-grown shells there may be observed a slight fold or tooth about the middle of the pillar, but which is seldom to be met with.

These shells vary considerably in their size, colour, and shape, some being more ventricose than others. Mr. Jeffreys, probably forgetting that these animals are all hermaphrodite, observes, "The females have their shells much more ventricose and with fewer volutions." (*Linn. Trans.* xvi. 351.)

14. CLAUSILIA. (Close Shell.)

The animal like Bulimus, but the shell is reversed, with an elongated, slender, fusiform spire, the last volution less tumid than the one before it, with an obtuse or papillary summit; aperture oval, oblique, united all round and margined, toothed; throat furnished with an internal spiral shelly plait, or *clausium*, fixed on an elastic pedicle, which closes the cavity when the animal is withdrawn.

The elegant spindle-shaped outline of this family having the last volution slenderer than the one above it, and being consequently more tumid above the aperture, fixes its distinction from *Bulimus*, as well as the peculiarity in the appendage.

The *clausium* or peculiar elastic valve in the last whorl of these shells was first noticed by D'Aubenton, in his *Distribution Méthodique des Coquillages*, in the *Mémoires de l'Académie des Sciences de Paris*, and accurately described by Otho F. Müller, in his excellent *Historium Vermium*, &c., in 1773, and by him called *ossicula* and *scala*. He beautifully and accurately described its peculiar functions.

Draparnaud has since described it as a new discovery, having overlooked Müller's account, though he frequently quotes his work. Cuvier, in his *Règne Animal*, iii. 45., speaks of it, but says he does not know its use to the animal.

In the *Annals of Philosophy* for 1822, Mr. Miller, who also appears not to have seen Müller's description, for he specially tells us that he discovered it in 1814, and showed it to Dr. Leach in the following year, before Draparnaud published his account of it, gives the following interesting account of its mechanism.

"Independently of the various contrivances which nature has resorted to for the protection of the otherwise easily vulnerable Mollusca, it has taken peculiar care to guard the apertures of many univalves from the intrusion of enemies; hence the apertures are sometimes peculiarly contracted and provided with numerous folds and teeth. Other Mollusca have a calcareous operculum permanently formed, which increases in thickness, and enlarges on a depressed spiral plane, as the opening of the shell extends with the growth of the animal, thus continually assimilating to its size, and when the animal retreats, excluding it completely from all external intrusion. In the *Clausilia*, nature has continued the protection afforded by means of contractions and folds, and also added an opercular appendage. The inhabitant of the *Clausilia*, when nearly full grown, secretes a thread-like elastic calcareous filament, one of whose ends is affixed to the columella. This filament makes half a spiral turn round the columella, insinuating between its folds. When the animal finishes its shell and completes the aperture, it secretes, at the unattached end of the filament, a spoon-shaped calcareous lamina conforming at its margin to the contour of the aperture. The lamina is somewhat smaller than this, and its margin is rounded.

"Its adhesion to an elastic filament enables the animal to push it, when it comes out of its shell, against the columella; and the same elasticity closes it, on the inhabitant retreating, thus securing it from intruding enemies. Thus, then, this valve may be compared to a door provided with an elastic spring. The elasticity of the filament may be restored to its full power (in the empty shell) by sometimes immersing it in water, as I have ascertained in a section, made with a view to this inquiry." (*Ann. Phil.* iii. 378.)

Draparnaud has named this valve-like appendage the *clausium*, and Cuvier (*Règne Animal*, ii. 409.) states, "de cette lame on ignore l'usage dans l'animal vivant."

In my conchological observations (*Zoological Journal*, i. 212.) I gave the following more particular account of this appendage.

"Of all the wonderful contrivances employed by nature for the protection of the Mollusca, there is none which is more calculated to excite the admiration of the conchologist than the *clausium*, an elastic appendage which closes the aperture of the *Clausiliæ*. It consists of a spirally twisted thin shelly plate, inclosed in the last whorl of the shell, and attached to the columella by an elastic pedicle. When the animal is retracted within its shell, this shelly plate nearly covers the aperture at a little distance within the mouth, and coming in contact with a transverse plait on the outer lip, leaves only a small canal, formed between the outer plait and the posterior angle of the mouth, and sometimes an elongated longitudinal plait on the inner lip. When the animal wishes to protrude itself, it pushes the plate on one side into a groove situated between the inner plait and the columella, where it is detained by the pressure of the body of the animal, leaving the aperture free; and when the animal withdraws itself, the plate springs forward by the elasticity of its pedicle, and closes the aperture. This curious structure, and also the plaits of the mouth, which are intimately connected with it, are not formed until the animal has nearly reached maturity. It is best exhibited by breaking off the outer part of the aperture to the distance of about half a whorl, when it will generally be found free; but in order to exhibit it behind the columella in its natural position, when the animal is exserted, it is necessary to kill the animal in that situation (by drowning it), and then suffer it to dry before the outer lip is broken off, and the pedicle will thus become fastened to the side by means of the dried mucus (of the body); it may, however, at any time be relaxed by a little moisture, when it will instantly resume its elasticity, and spring from its attachment."

Montagu, who described the animals of all the species he knew, enters into a long explanation respecting the difference between sinistral or reversed and dextral shells. Formerly, all reversed shells were considered as monstrosites, but now it is well known that some species which are generally dextral, are often found reversed; and this monstrosity consists not only in the shell being turned in the contrary direction down the imaginary axis, but the animal itself has all the organs placed on the opposite side of the body. There are some few Mollusca which appear to be very liable to this monstrosity, as *Bulimus aureus*, *Pyrula perversa*, and the whole genera of *Clausilia* and *Physa*, the natural character of which is to be reversed. It would be a monstrosity in them to find them dextral or twisted in the same direction like other shells. (See *Phil. Trans.* 1833.)

* MARPESSA *Gray.*

Clausium notched at the tip, fitting into a plait on the outer lip of the shell; shell smooth.

78. 1. CLAUSILIA *bidens.* Laminated Close Shell. (t. 5. f. 53.) Shell nearly smooth, glossy, and transparent; aperture with two white plaits clausium emarginate.

Helix bidens. *Müller, Verm.* ii. 116.; not *Linn.*
Turbo laminatus. *Mont.* p. 359. t. 11. f. 4.
Clausilia bidens. *Drap.* p. 60. t. 4. f. 5-7.; *Brard,* p. 83. t. 3. f. 9.; *Alder, Mag. Zool. & Bot.* ii.

110.; *Pfeiffer*, 60. t. 3. f. 25.; *Rossm. Icon.* i. 76. t. 2. f. 29.

Clausilia lamellata. *Leach, Mollusc.* p. 118.

Helix Cochlodina derugata. *Fér. Tab.* 63.

Clausilia laminata. *Turton, Man.* ed. 1. 70. f. 53.

Bulimus bidens. *Brug. E. M.* 352.

In beech woods, among decayed leaves, and on the bark of trees, especially in a chalky soil.

Animal pale fulvous; upper tentacles long, clavate. (*Sturm, Fauna*, t. .)

Shell half an inch long, of a glossy reddish horn-colour and nearly smooth; spire composed of twelve raised volutions; aperture roundish-oval with a white thick margin, attached at the upper part of the body volution, with two laminar folds, one of them straight and placed near the top of the aperture and almost central, the other curved and in the middle of the pillar lip, frequently crenate; and deep within the mouth are three or four permanent ridges which are visible on the back at the outside when held before a strong light.

Varies greatly in size, ventricoseness, and colour, being sometimes greenish white and transparent.

Montagu (*Test. Brit.* 359.) considered the white variety as a shell deprived of its brown epidermis, but the periostraca is as distinct on the greenish white shell as on the brown specimen; both the shell and the periostraca are differently or rather uncoloured in that variety, from the absence of the colouring matter.

Dr. Turton, by an oversight, first describes the operculum as emarginate, and then makes his third variety to be characterised by the internal lamina being notched.

* * IPHIGENIA *Gray.*

Clausium entire at the top; shell corrugated.

79. 2. **CLAUSILIA** *biplicata.* Folded Close Shell. (t. 5. f. 55.) Shell ventricose, opake grey-brown, with regular raised striæ; aperture with two plaits, the margin detached all round.

Turbo biplicatus. *Mont.* p. 361. t. 11. f. 5.
Clausilia ventricosa. *Drap.* p. 71. t. 4. f. 14.; *Jeffreys, Linn. Trans.* xvi. 354.
Clausilia biplicata. *Leach, Mollusc.* p. 120.
Clausilia Montagui. *Gray, Ann. Phil.* 13.
Helix perversa, adult. *Müller, Verm.* ii. 118.
——— Cochlodina ventricosula. *Féruss. Tab.* 63.
Clausilia similis. *Charp? Rossm. Icon.* 177. t. 2. f. 30?
Cochlodina similis. *Férussac?*

In woods and close hedges.

Animal dark grey.

Shell nearly three quarters of an inch long, dark grey, opake, regularly striate longitudinally; spire consisting of eleven or twelve rather flat but well-defined volutions; the suture a depressed line; aperture oval, a little sinuous at the upper and inner angle, with two plaits, one near the top of the pillar lip, and the other not quite half way down, both of them approaching each other as they recede inwardly; the margin white, and detached all round. Varies with one or two additional minute denticles in the mouth.

M. Férussac originally referred *T. biplicatus* Mont. to *C. ventricosa* Drap., but he afterwards adopted the opinion that they were distinct: the British shell is more slender and spindle-shaped than the French; they are, perhaps, only local varieties; but it is extremely difficult to define the species of this genus.

This species was first described as British by Montagu.

80. 3. CLAUSILIA *Rolphii.* Rolph's Close Shell. (t. 5. f. 54.) Shell ventricose, thin, opake, red-brown, with regular crowded raised striæ; aperture with four or five plaits, two of which are longer.

Clausilia Iphigenia Rolphii. *Gray, Med. Repos.* 1821. 182.

Clausilia Rolphii. *Leach, MSS.; Gray, Ann. Phil.* 15.; *Férussac, Journ. Phys.* 1820. 301.; *Leach, Mollusc.* ined. p. 119.; *Alder, Mag. Zool. and Bot.* ii. 111.; *Turton, Man.* ed. 1. 71. f. 54.

Clausilia plicatula. *Drap.* p. 74. t. 4. f. 17, 18.?; *Brard,* p. 85. t. 3. f. 10.?; *Jeffreys, Linn. Trans.* xvi. 353.; *Rossm. Icon.* p. 39. t. 2. f. 32.

In damp places in woods, among the moss and stones, under nettles and dogs' mercury, and on trunks of trees, on a chalky soil.

Animal grey.

Shell an inch long, of a greyish brown horn-colour, tumid in the middle; spire composed of ten or eleven rather swollen volutions, which are marked with regular raised longitudinal lines; aperture roundish-oval, sinuous at the upper and outer angle; the margin thick, white, detached all round, with four or five plaits, two of which are much longer than the rest.

Férussac, in his list of British Shells (*Journ. Phys.* 1820. 301.), says this shell has no analogy with any of Draparnaud's; and Mr. Alder observes that it is distinct from *Clausilia plicatula* Drap., to which it has been referred.

The species was first discovered by Mr. Rolph in Charlton Wood, Kent. It was first indicated as British by Férussac, and then by myself. I have since, at two distant periods, found it in the same locality, and I have seen specimens from Hastings, Sussex.

Like other species, it is sometimes found transparent and colourless. Dr. Turton indicates three varieties in the teething, but it is very variable in this respect.

81. 4. CLAUSILIA *dubia*. Doubtful Close Shell. (tXII. f. 143.) Shell dark brown, rather ventricose, with strong raised striæ, rendered somewhat granular by a few spiral ridges on the lower whorls; whorls ten or twelve, a little rounded; aperture with two teeth on the pillar, the lower one forked internally; peristome whole, detached, and reflexed.

Clausilia dubia. *Drap.; Alder, Cat. Supp.* l. c. 3. *Mag. Zool. & Bot.* ii. 111.
Clausilia rugosa, var. *Alder, Cat.* l. c. 32.
———— similis. *Gilbertson, MSS. B. M.;* not *Fér.*

Inhab. rocks under moss — North of England.

This shell is about 5-8ths of an inch long, and 1-8th broad.

Mr. Alder, who first introduced this shell into the Fauna, observes, that it is undoubtedly the *C. dubia* of continental authors. It may be distinguished from *C. rugosa* by its greater size and ventricosity.

82. 5. CLAUSILIA *nigricans*. Dark Close Shell. (t. 5. f. 58.) Shell slender, sub-opake, black-brown, with fine raised somewhat granular striæ; aperture with three plaits, the margin white and detached all round.

Helix perversa. *Müller, Verm.* 118.
Bulimus perversus. *Brug.*
Clausilia rugosa. *Drap.* p. 73. t. 4. f. 19, 20.; *Leach, Mollusc.* p. 121.
Turbo bidens. *Montagu,* p. 357. t. 11. f. 7.
—— nigricans. *Dillw.* 375.; *Pult. Dorset.* 46.; *Turt. Dict.* 225.
Turbo perversus. *Penn. Brit. Zool.* iv. t. 82. f. 116.
Clausilia nigricans. *Jeffreys, Linn. Trans.* xvi. 351.
Odostomia nigricans. *Flem. Ed. Ency.*
Clausilia perversa. *Flem.*
Var. 1. smaller, more slender.
Clausilia parvula. *Leach, MSS. B. M.*; *Turton, Zool. Journ.* ii. 556., *Man.* ed. 1. 74. f. 58.; *Jeffreys, Linn. Trans.* xvi. 352.; not *Studer.*
Var. 2. shorter, fewer whorls.
Clausilia Everettii. *Miller, Ann. Phil.* n. s. xix. 377.

Common under stones and in old walls.

Animal brown, corrugated, foot narrow.

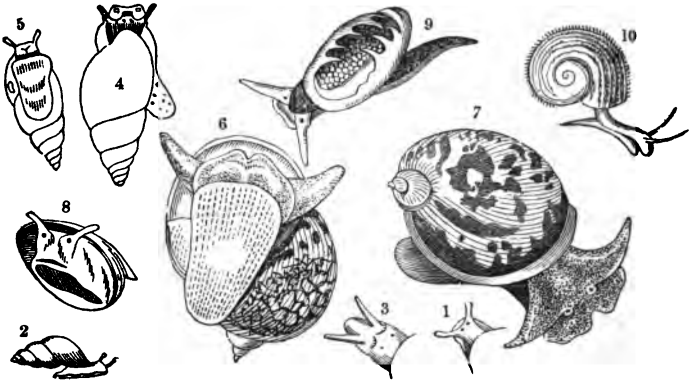
Shell about half an inch long, glossy black or grey, often marked with short cinereous streaks, with regular raised lines, which, when closely examined, appear a little granular; spire composed of from seven to ten rather raised volutions; aperture oval, with the inner lip a little contracted, with three plaits, all on the pillar, the lower one interior and hardly distinguishable in the full-grown shell; the margin thick and white, but not reflected, detached all round.

This very common species varies greatly in size, in the slenderness and ventricoseness of the shell, and in the strength or slightness of the concentric striæ, but in a large series all these varieties gradually and uninterruptedly pass into one another, and they may all be found in specimens collected from the same locality. It is also rarely found transparent and colourless. Mr. Jeffreys describes a distorted specimen, with a prominent medial ridge down the whorls.

Mr. Alder has kindly communicated to me "a specimen of the shell he sent to Dr. Turton, which Dr. Turton calls *C. parvula* (t. 5. f. 59.); and also the specimens of the true *C. parvula* (according to Férussac), found in Germany, for comparison." He further observes, that all the British specimens he has seen, he thinks, are only varieties of *C. nigricans*, which, I think, the specimen fully bears out.

B. THE AQUATIC FREE-AIR-BREATHING MOLLUSCA have two contractile, compressed tentacles, with the eyes sessile, near their base; the head is contractile; they are not provided with any operculum. They are all aquatic, and the British species are divided into two families. (See p. 101.)

AURICULIDÆ. **LIMNÆADÆ.**



1. 2. Carychium minimum.
3. Acme fusca.
4. Conovulus denticulatus.
6. 7. Limnæus auricularis.

8. Ancylus fluviatilis.
9. Physa fontinalis.
10. Planorbis albus.

Fam. 4. AURICULIDÆ.

The animal with an elongated foot, an elongate ringed muzzle, two subcylindrical tentacles, with the eyes near the inner side of their base; body spiral, placed on the centre of the foot, and covered with a thin mantle, with a thickened edge, which is itself covered with an external spiral shell, which has a plaited pillar in all its ages.

These Mollusca appear, by their habit and character, to be exactly intermediate between the land and the fresh-water Univalve Mollusca. They have the sessile eyes of the Pond-snails placed behind, instead of in front of the tentacles, and the subcylindrical tentacles of the Land snails, but the tentacles are not retractile under the skin of the neck. In the same manner, the *Carychia* and the *Acmea* are terrestrial, living in damp moss; the *Conovuli* live in the mud at the mouths of rivers, or in the sea: they seldom leave salt or at least brackish water. There are some foreign species which live in ponds, and have all the habits of our Pond-snails, only their pillar is more distinctly plaited.

Montagu observes, "A remarkable character of this shell (*Voluta denticulata*) is that the columella extends no further than the upper part of the body volution, the superior spires (whorls) being destitute of any pillar or internal spiral division." This peculiarity is common to most species of this family, and is one of its best conchological characters: the absence is generally caused by the animal absorbing the septa which separate the upper whorls, and thus converting the spire into a single cavity, as it enlarges the shell at the edges of the mouth below. In *Scarabus*, the septa between the whorls appear to be originally formed imperfect. (See *Phil. Trans.* 1833.)

This family contains only three British genera: —

1. *Carychium.* Shell ovate; mouth oblong, three-toothed; peristome reflexed. (p. 219. f. 1, 2.)
2. *Acme.* Shell cylindrical; mouth ovate, simple; peristome simple. (p. 219. f. 3.)
3. *Conovulus.* Shell ovate; mouth linear, pillar with two or three plaits. (p. 219. f. 4, 5.)

1. CARYCHIUM *Müller.* (Carychium.)

Shell spiral, thin, conic-ovate; mouth oblong, longitudinal, two or three-toothed, compressed, rather oblique, rounder at each end; peristome interrupted, thickened, and rather reflexed. p. 219. f. 2.

83. 1. CARYCHIUM *minimum.* Minute Sedge Shell.

Turbo Carychium. *Mont.* p. 339. t. 22. f. 2.; *Linn. Trans.* viii. 184.
Auricella Carychium. *Hartmann*, 49.
Auricula minima. *Drap.* p. 57. t. 3. f. 18, 19.
Carychium minimum. *Leach*, *Moll.* 133.; *Müller*, *Verm.* ii. 125.; *Jeffreys*, *L. T.* xvi. 365.
Odostomia Carychium. *Flem: Ed. Ency.*

At the roots of grass and moss in moist places.

The animal is yellowish white, with only two short cylindrical, blunt, or truncated tentacles, at the base of which, between, or nearly behind them, are placed two very conspicuous approximating black eyes. (p. 219. f. 1, 2.) (*Montagu, T. B.* 340.; *Sturm*, t. 1. f. 3.)

Shell hardly the tenth of an inch long, conic, white, shining, with a yellowish cast, transparent; spire composed of five rounded volutions, very finely striate longitudinally, and ending rather obtusely; aperture semioval or rather ear-shaped, rounded at both the ends, with two teeth on the pillar, and sometimes a small one above the others; the margin thick, and in the middle of the outer lip a thick tooth-like protuberance.

This common species was first noticed by Mr. Boys (*Test. Min. Rar.* f. 51.).

Mr. Jeffreys has erroneously referred the *Turbo tridens* to this genus, under the name of *Carychium politum.* (*Linn. Trans.* xvi. 363.)

2. Acme *Hartmann.*

Shell subcylindrical, with a blunt tip; mouth ovate, simple, outer lip simple, thin, slightly reflexed over the pillar, forming a slight perforation.

Animal with two long contractile slender tentacles, between which and the eyes, at their hinder base, are two jagged blackish spots. (See p. 219. f. 3.)

Dr. Turton (*Manual*, ed. 1. p. 83.) appears to have considered the spot at the base of the tentacles as the rudiment of a lower pair. Dr. Hartmann (*Sturm, Fauna*, t. 1. f. 4.) describes the tentacles as retractile; but he uses the same term to describe the tentacles of *Cyclostoma* and *Carychium*, which agree with these in only being contractile, and not retractile like those of *Helices*, and other land Mollusca.

This genus, on account of the similarity of its shell, has been confounded also with *Truncatella* of Risso, which is a marine animal, provided with gills and a distinct operculum.

The animal walks with its shell nearly perpendicular, twisting it round in a very odd manner, and then letting it suddenly fall again.

Though this species has been generally placed in the genus *Carychium*, neither the animal nor the shell well agrees with that genus. The animal most nearly resembles a *Cyclostoma*, with its long filiform tentacles and proboscidiform head; but it has no operculum. The shell has some resemblance to some *Bulimi*. Dr. Turton placed it in that genus, and erroneously describes the animal as having four tentacles.

84. 1. ACME *fusca*. Brown Acme. (t. 6. f. 66.) Shell cylindrical, obtuse, glossy brown, transparent, with rather distant parallel oblique longitudinal striæ. (p. 219. f. 3.)

Turbo fuscus. *Boys and Walker, Test. Min. Rar.* 12. t. 2. f. 42.; *Wood, Supp.* t. 6. f. 15.

Auricula lineata. *Drap. Hist.* 57. t. 3. f. 20, 21.

Carychium cochlea. *Studer, Catal.* 21.

——— lineatum. *Férussac, Tab. Syst.* 100.; *Rossm.* v. 54. t. 28. f. 408.

Cyclostoma lineatum. *Férussac, Dict. Class. H. Nat.* ii. 90.; *Pfeiffer.*

Acme lineata. *Hartm. Fauna,* t. 1. f. 4.

Carychium fuscum. *Fleming, B. A.* 270.; *Jeffreys, Linn. Trans.* xvi. 364.

Bulimus lineatus. *Turton, Man.* ed. 1. 82. f. 66.

Inhab. on moss and Jungermanniæ, in damp places, springs, &c.

Shell the tenth of an inch long, of a cylindrical form, and hardly decreasing in diameter for its whole length, highly polished and marked with rather remote regular longitudinal striæ, which are hardly distinguishable without a good glass; spire composed of six very slightly raised but well-defined volutions, the two terminal ones of which are smaller and paler; aperture roundish-oval, with the margin thin, and a little reflected at the pillar, where it forms a slight perforation.

The animal and shell are sometimes dark brown and at others pale yellowish white. They are sometimes found reversed.

3. CONOVULUS. (Conovulus.)

Shell oval, obconic, last whorl long, compressed; mouth linear; pillar with two or three spiral plaits; outer lip simple, or very slightly reflexed; throat grooved.

The foot of the animal is obovate, oblong, blunt in front and behind; tentacles contractile, filiform, slightly ringed; eyes at their inner base; muzzle porrect, notched in front, as in *Limnæus*; mantle closed all round, with the exception of a perforation at the point of junction of the outer and inner lip. The pillar of the shell is plaited in all ages.

The animal, in habit, manner, and appearance, very greatly resembles that of *Aplexa* or *Limnæus*, but differs in the tentacles being filiform and ringed.

They live in brackish water, and salt-water marshes, at the roots of rushes, and are sometimes found under stones on the sea-shore near the mouth of rivers.

Mr. Lowe (*Zool. Journ* iv. 280.) at one time thought that the animal might be ptenobranchous, but he has since seen reason to doubt this conclusion; and the question has been settled by Mr. Berkeley's admirable observations and figures of the animal (*Zool. Journ.* v. 429. t. 19. f. 3.).

On account of the marine or semimarine habit of most of the species of this genus, they were not noticed by Dr. Turton in the first edition of this Manual; but as they are the only British *Pneumonobranchiata* which inhabit such places, and as I have found *C. denticulata* high up the Thames, I have been induced to insert them.

* OVATELLA. (Bivona.)

Pillar 3-5-*plaited; mouth toothed; peristome slightly reflexed.* Paludinal.

85. 1. CONOVULUS *denticulatus.* Denticulated Conovulus. (t. XII f. 144.) Shell oblong, brittle, smooth, brown or purplish; spire conical; mouth oblong, rather thickened; pillar three or five-plaited. (p. 219. f. 4, 5.)

Turbo bidentatus. *Walker, Test. Min. Rar.* f. 50. and 53.

Voluta denticulata. *Mont. Test. Brit.* 234. t. 20. f. 5.; *Berkeley, Zool. Journ.* v. t. 19. f. 3. Animal.

Voluta ringens. *Turton, Conch. Dict.*

——— reflexa. *Turton, Conch. Dict.*

Auricula myosotis. *Jeffreys, Linn. Trans.* xvi. 368.; not *Drap.*

Acteon denticulata. *Fleming, B. A.*

Auricula personata. *Desh. Lam.* ed. 2. viii. 332.

Carychium personatum. *Mich. Compl.* 73. t. 15, f. 42, 43.

Inhab. clefts of rocks near the high-water marks, and in the mud left bare by the tide at the mouth of rivers.

Animal purplish.

The habits of the animal are very like those of *Limnæus fossarius* and *palustris*, which are sometimes found occupying the same situations a little distance up the river that these animals do at its mouth.

This shell was first recorded as British by Boys, who found it in the marshes near Faversham, at the roots of rushes. It has usually been considered as the *A. myosotis* of Draparnaud, but that has no teeth on the outer lip.

This species varies considerably;—1. In size; 2. In colour, from purplish brown to brownish, while some are also very rarely found nearly hyaline; 3. In the length of the spire and in the ventricoseness of the volutions. The mouth is generally strongly toothed; but sometimes it is nearly smooth. These variations induced Dr. Turton, in his Dictionary, to divide it into three species.

Mr. Lowe doubts the propriety of referring *Voluta denticulata* to the genus *Melampus*, because he thinks that it has a periostraca, which, he believes, the other wants; but the fact is, they all have it, and in this species it is only rather thicker than in the others. (*Zool. Journ.* iv. 291.)

Montagu (*Test. Brit.*) and Miller (*Ann. Phil.* iii. 577.) truly describe the apex of the shell as being destitute of any septa.

Mr. Jeffreys suspected that *Voluta hyalina* Montagu was only an imperfect specimen of this species: Montagu's specimen is a foreign marine shell not yet arrived at its full growth.

* * Leuconia.

Pillar two-plaited; throat smooth; peristome simple.
Marine.

86. 2. Conovulus *bidentatus*. Two-toothed Conovulus. (t. xii. f. 145.) Shell ovate, ventricose, smooth, shining white; spire short; suture indistinct; mouth oblong; two of the plaits of the pillar larger than the rest; peristome slightly thickened and reflexed in front.

Voluta bidentata. *Mont. T. B. Suppl.* 100. t. 30. f. 2.

Auricula bidentata. *Férussac, Tab. Moll.* 103.; *Gray, Ann. Phil.* 15.; *Jeffreys, Linn. Trans.* xvi. 368.

Var. Auricula erosa. *Jeffreys, Linn. Trans.* xvi. 269.

Inhab. the sea-coast (of Devon), under stones left by the tide.

Animal, according to Montagu, is white, with two very short angular tentacula, usually edged with black, and with two black eyes at their base behind; the foot extending before the head, bifid.

The spire of the shell is sometimes eroded, and because the specimens which Mr. Jeffreys observed in this state were a little more ventricose, he has described them as a different species.

87. 3. Conovulus *albus*. Shell fusiform, pointed, thin, white, pellucid, slightly transversely striated; whorls six; mouth slender, oblong; pillar two-plaited.

Voluta alba. *Mont. T. B.* 245. (not *Suppl.*); *Turton, Dict.*

Auricula alba. *Gray, Ann. Philos.* 15.; *Jeffreys, Linn. Trans.* xvi. 370.; *Forbes, Malac. Monen.* 12.

Volvaria alba. *Fleming.*

Inhab. sea-coast near the mouths of rivers, under stones left by the tide.

The animal pellucid white.

When alive, the shell is milk-white, with the spire reddish, with a pellucid spiral line about half the breadth of the whorl from the suture.

Dr. Fleming, evidently from not knowing the species, refers *C. denticulata* to *Acteon*, and *C. albus* to *Volvaria*, both being genera of Ptenobranchous Mollusca.

Fam. 5. LIMNÆADÆ.

Animal with an elongate foot, a more or less conical spiral body, a short muzzle, with dilated lips and compressed tentacles, with the eyes near their outer base: the mantle, which covers the body, has a thin edge and is protected by a variably shaped pale uniform-coloured shell, which is clothed with a hard olive periostraca.

They live in ponds and ditches, often floating on the surface of the water, their back downwards, or crawling on the mud at the bottom, or on aquatic plants, but always coming to the surface to respire.

These animals were scattered about by the Linnæan conchologists among the *Helices*, the *Turbines*, the *Bullæ*, the *Nautili*, and the *Patellæ*, because their shells vary considerably in their shape and form. They form, however, a most natural group, from their having very similar animals. Like water-plants, they are distributed very widely, and are to be found in almost all parts of the world.

It had been supposed that the shells of fluviatile Mollusca could be distinguished from those of the terrestrial kind, by the edge of the mouth of the shell never being furnished with a thickened internal rib, and not being in the slightest degree reflexed, and that the animal never closes it with an *epiphragm ;* however, further examination has shown that when the Pond-snails and the Whirl-shells are left nearly dry by the evaporation of the water, either by the heat, or by dryness of the weather in winter, these animals assume the character of terrestrial Mollusca, thicken and reflect their mouth, and form an epiphragm to prevent themselves from being destroyed by the drying up of the fluid necessary for their respiration and life. Specimens in this state have been observed by Müller, Maton and Racket, Montagu, Michaud, and others, and have generally been considered as distinct species.

The family contains eight genera, which may be thus distinguished: —

I. Shell ovate, spiral; pillar with an oblique plait.
  1. *Limnæus.* Shell rough; inner lip simple. (p. 219. f. 6, 7.)
  2. *Amphipeplea.* Shell polished, thin; inner lip expanded.

II. Shell conical, recurved; apex oblique.
  3. *Ancylus.* Apex of the shell to the right. (p. 219. f. 8.)
  4. *Velletia.* Apex of the shell to the left.

III. Shell ovate, spiral; pillar simple.
  5. *Physa.* Inner lip expanded. (p. 219. f. 9.)
  6. *Aplexus.* Inner lip not expanded.

IV. Shell discoidal.
  7. *Planorbis.* Cavity of shell simple; mouth roundish or subquadrate. (p. 219. f. 10.)
  8. *Segmentina.* Cavity of shell divided by cross septa; mouth triangular.

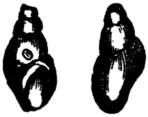
* *Tentacles short, compressed, triangular, without any auricle at the base.* (Limnæana.)

1. Limnæus. (Mud Shell.)

Animal with a short broad foot, broad short compressed tentacles, without any auricles at the base, a large central spiral body, and a simple-edged mantle, covered by an external ovate, thin, dextral, transparent spiral shell with an ovate mouth, having a single oblique plait on the middle of the column running into the axis. (See p. 219. f. 6, 7.)

This genus is known from *Amphipeplea* and *Physa* by the edge of the mantle not being produced so as to cover the shell, and by the inner lip not being extended over the body whorl of the shell. It is known from *Aplexus* by the shell being dextral, and having the pillar-plait; the latter character, and their greater solidity, will distinguish even the reversed monstrosities of these shells from that genus.

The apex of the shell is often eroded or truncated; that is to say, as the upper part of the body is withdrawn from the tip, and the body moves forwards into the larger part of the shell, it forms a septum behind, and the part that is thus separated eventually falls off. Mr. Jeffreys, not being conversant with the physiology of the Mollusca, gives a curious explanation of this phenomenon, which is not uncommon in the terrestrial and marine, as well as fresh-water Mollusca. "In the absence of other nourishment, they (the *Limnæi*) will even devour each other, piercing the shell near its apex, and eating away the upper folds of the inhabitants. This ac-



counts (he proceeds) for the mutilated and often imperfectly repaired state of the upper volutions of some specimens." (*Linn. Trans.* xvi. 371. But see *Turton* *, *Man.* ed. 1. 78.; *Gray*, *Phil. Trans.* 1833.)

In the spring, these animals are often infested with a small slender species of *Gordius*, which affix themselves to the edge of the mantle over the back of the neck; they are so common that Draparnaud mistook them for the respiratory organs of the animal. Montagu has also observed them on *L. truncatulus.*

* RADIX *Montfort.* (Gulnaria *Leach.*)

Shell subovate, last whorl ventricose; mouth more than half the length of the shell.

88. 1. LIMNÆUS *auricularius.* Wide-mouthed Mud Shell. (t. 7. f. 100.) Shell extremely inflated, striolate, with a very short acute spire; aperture oblique, vastly expanded and roundish-oval.

Limneus auricularius. *Drap.* p. 49. t. 2. f. 28, 29. 32.; *Jeffreys*, *Linn. Trans.* xvi. 372.; *Rossm. Icon.* i. 98. t. 2. f. 55.
Lymnæa auricularia. *Lamarck*, vi. ii. p. 161.
Lymneus auricularius. *Brard*, p. 140. t. 5. f. 2, 3.; *Turton*, *Man.* ed. 1. 117. f. 100.
Radix auriculatus. *De Montfort*, ii. p. 207.
Gulnaria auricularia. *Leach*, *Mollusc.* p. 148.
Helix auricularia. *Linn. S. N.* i. 1250.; *Penn. B. Z.* iv. 86. f. 138.; *Mont.* p. 375. t. 16. f. 2.
Helix limosa. *Montag. T. B.* 381. t. 16. f. 1. ?

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* Dr. Turton, by mistake, appears to think that the shells have "a vascular connection" with the animal. This is not the case; but still the description he gives of how the apex falls off is true; and Müller is correct in saying the apex of the shell was once perfect.

Buccinum auricula. *Müller*, *Verm.* ii. 126.; *Sturm*, *Fauna*, vi. 12.

Bulimus auricularius. *Brug. E. M.* n. 14. f.

In stagnant and slow waters.

Animal dull greenish yellow; tentacles speckled with brighter spots. (*Sturm*, t. 38.)

Shell an inch long, and three quarters wide, thin, brittle, transparent, of a light yellow horn-colour, more or less distinctly striate longitudinally; spire composed of four volutions, the three terminal ones very small; aperture vast, somewhat oval, with the outer lip expanded; pillar with a strong fold, the lip reflected and forming a slight hollow behind it.

The eggs are scarcely different from those of *L. stagnalis*. (See *Pfeiffer*, t. 7. f. 8.)

89. 2. LIMNÆUS *pereger*. Puddle Mud Shell. (t. 7. f. 101.) Shell ventricose, more or less striate, with a moderately short acute spire. (p. 219. f. 6, 7.)

Limneus pereger. *Drap.* p. 50. t. 2. f. 34. 37.; *Jeffreys*, *Linn. Trans.* xvi. 374.; *Turton*, *Man.* ed. 1. 118. f. 101.

Lymnæa peregra. *Lamarck*, vi. ii. p. 161.

Gulnaria peregra. *Leach*, *Mollusc.* p. 146.

Helix peregra. *Gmelin; Mont.* p. 373. t. 16. f. 2.

Helix putris. *Penn. B. Z.; Turt. Dict.* p. 67.

Buccinum peregrum. *Müller*, *Verm.* ii. 134.

Bulimus pereger. *Brug. E. M.* n. 10.

Lymnæa putris. *Flem. Ed. Ency.*

Lymnæus vulgaris. *Pfeiffer*, i. 89. t. 4. f. 22.; *Rossm. Icon.* i. 97. f. 53.; not *Jeffreys*.

Var. 1. Subovate, aperture more dilated; spire acute.

Limneus ovatus. *Drap.* p. 50. t. 2. f. 30, 31.

Lymneus ovatus. *Brard,* p. 142. t. 5. f. 4, 5.

Lymnæa ovata. *Lamarck,* vi. ii. p. 161.; *Kenyon, Mag. Nat. Hist.* ii. 425. f. g.

Helix limosa. *Linn.? Mont.* p. 381. t. 16. f. 1.

Lymnæus ovatus. *Rossm. Icon.* i. 100. t. 2. f. 56.

Bulimus limosus. *Pioret, Prod.* 39.

Limnea lineata. *Bean, Mag. Nat. Hist.* vii. 493. f. 62.

Var. 2. Spire rather tapering, acute.

Lymneus acutus. *Jeffreys, Linn. Trans.* xvi. 373.

Var. 3. The shell thicker, and the outer lip not attenuated; spire scarcely exserted.

Helix lutea. *Mont.* p. 380. t. 16. f. 6.; *Linn. Trans. Soc.* viii. 222., xiv. 169.

Var. 4. Shell moderate; spire very short, eroded, often concentrically grooved.

Gulnaria lacustris. *Leach, Mollusc.* p. 146.

Lymnea lacustris. *Brown, Brit. Shells,* t. 42. f. 24, 25.?; *Potiez and Michaud, Gal. Moll.* i. 210. t. 22. f. 11, 12.

1. Monstrosity with the outer lip thickened, with an internal rib, and expanded. (*Maton, Linn. Trans.* viii. 218. t. 5. f. 8.* *Montag. Supp.* 129.)

Lymnea marginata. *Michaud, Compl.* 88. t. 16. f. 15, 16.

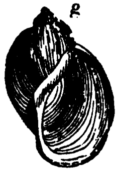
Lymneus pereger. *Jeffreys,* l. c.

2. Monstrosity, spire reversed.

Limnea lineata. *Bean*, l.c.

Inhab. ponds and ditches.

Animal olive, yellow spotted. (*Sturm*, t. 39.)



Shell varying much in size, of a greyish or yellowish colour, more or less concentrically striated; spire moderately elongated, about a third part the length of the whole shell, with the lesser volutions not so abruptly disproportionate to the body one as in the former; aperture oval-oblong with the umbilicus sometimes obliterated.

The shells are often covered with a calcareous fur or deposit, which nearly hides them, and which has been sometimes mistaken for periostraca.

All the varieties run so much into each other, that they can hardly be considered as specifically distinct.

Mr. Jeffreys says, "I have no hesitation in referring the *Helix lutea* of Montagu to a variety of this species, having found it, both in a living state and thrown up together with other varieties, on the sea-shore near Swansea, within the influx of the Britton Ferry river." Nilson describes one species as living in brackish water in Sweden. The varieties of the shell are in some situations often found reversed, as is the case with the variety recorded by Mr. Bean at Scarborough. It is not uncommon to find some specimens, the spires of which are more or less unrolled, or separated from each other. Indeed, this distortion appears to be more common in this shell than any other British species I am acquainted with.

Rossmäsler (*Icon.* i. 98.) thinks that Dr. Turton's figure (f. 101.) represents what he considers a species under the name of *Limnæus vulgaris*, which is not the *L. vulgaris* of Jeffreys.

Mr. Jeffreys says, "The young shells of *L. acutus* are of a more elongated form than those of either *L. auricularius* or *L. pereger*. It has a more oblique and less ampullaceous form, and is of a thicker consistency, than *L. auricularius*." Mr. Alder regards this variety as intermediate between *L. pereger* and *L. auricularius*, and says, that if it is not a distinct species, it may lead us to unite them all into one. It comes very near *L. lineatus* of Mr. Bean. The single specimen we have in the British Museum, from Mr. Alder, leads me here to consider it only a variety of *L. pereger*, as it much resembles a common London variety of that shell; and I still think *L. auricularius* is a species.

The *Gulnaria lacustris* of Leach is very peculiar, from the erosion of its tips, probably arising from its locality, the lakes of Cumberland. We have very similar, but rather darker and thicker shells, with lips perfect, from Lough Neagh, Ireland.

The latter variety may prove a distinct species, when we shall have received more specimens and are able to observe the animal.

90. 3. LIMNÆUS *stagnalis*. Lake Mud Shell. (t. ~~X.~~ IX. f. 104.) Shell oval, subulate, pointed, brittle; spire acute; whorls five; lower volution much inflated, and somewhat angular; the suture deep.

Limneus stagnalis. *Drap.* p. 51. t. 2. f. 38, 39.; *Alder*, l. c. 114.; *Turton*, *Man.* ed. 1. 121. f. 104.

Lymneus stagnalis. *Brard*, p. 133. t. 5. f. 1.
Lymnus stagnalis. *De Montfort*, ii. p. 268.
Limnea stagnalis. *Sowerby*, *Gen.* f. 1.
Lymnæa stagnalis. *Lamarck*, vi. ii. p. 159.
Stagnicola vulgaris. *Leach*, *Mollusc.* p. 145.
Helix stagnalis. *Linn.* *S.* *N.* i. 1249.; *Mont.* p. 367. t. 16. f. 8.
Bulimus stagnalis. *Brug. E. M.* n. 13.
Lynneus major. *Jeffreys*, *Linn. Trans.* xvi. 375.
Limnæus stagnalis. *Rossm. Icon.* i. 95. t. 2. f. 49.
Var. 1. thinner, whorls rather more oblique and less ventricose.
Stagnicola elegans. *Leach* ; — *Schroer*, *Fluss. Conch.* t. 7. f. 6. ?
Helix fragilis. *Mont. T. B.* 369. t. 16. f. 7.
Limneus fragilis. *Turton*, *Man.* ed. 1. 121. f. 105.
Var. 2. thicker, with a purple throat.
Buccinum roseo-labiatum. *Sturm*, *Fauna*, t. 36, 37.

In stagnant and slow waters.

Animal yellowish, paler beneath. (*Sturm*, t. 34 and 35.)

Shell an inch and a half long, and nearly an inch wide, thin and brittle, of a greyish white colour, often covered with an extraneous coat; spire composed of six or seven volutions, which are rounded and tumid, tapering to a fine point; the larger one striate longitudinally, and generally crossed by raised transverse lines, giving it an angular appearance like cut glass; pillar with the fold very strong, forming a slight umbilicus, the lip white and spread.

These shells vary greatly in thickness, according to the nature of the water they inhabit. The outer whorl of the adult shell is often very gibbous. These variations have caused the animal, when found in clear quiet water, to be considered as a separate species.

Dr. Turton's figure (*Man.* ed. 1. f. 102.) of *Physa scaturiginum* has been suspected to represent a young individual of this species. It is a copy of Draparnaud's, which is a very doubtful species; and thought to be the young of some land shell. A reversed distortion is sometimes found. (*Hanow Seltenheiten*, ii. t. 1. f. 5.)

Montagu erroneously thought that these animals were unisexual; for he observes the sexes, too, are distinct, as is usual in aquatic *Limaces.*

The eggs are ovate, with a yellow spot; they are united together into elongated subcylindrical or oblong masses, attached to water-plants, &c. (See *Pfeiffer*, f. 13, 14, 15.)

Rossmäsler has described a North American species, like the first variety, under the name of *L. speciosus* (t. 2. f. 50.).

M. Deshayes and M. Prevost have remarked, that the impregnation of these animals is only accomplished by the participation of three individuals; the middle one using the functions of both sexes, the two others that of the male and the female only. Sometimes the outer individual impregnates another individual, so that the animals form a more or less long chain floating on the surface of the water.

In the Danube this species grows to four times the size of the usual English variety, but does not otherwise differ from it.

* * STAGNICOLA *Leach.*

Shell subconical or elongate; whorls gradually enlarging; mouth generally shorter than the spire.

91. 4. LIMNÆUS *palustris.* Marsh Mud Shell. (t. IX. f. 107.) Shell conic-oval, with six rather tumid volutions, the lower one somewhat angular by raised transverse and longitudinal striæ; mouth ovate; throat brown or violet.

Limneus palustris. *Drap.* p. 52. t. 2. f. 40—42. and t. 3. f. 1, 2.; *Alder*, l. c. 114.; *Turton, Man.* ed. 1. 123. f. 107.

Limnæus palustris. *Rossm. Icon.* i. 96. f. 51, 52.

Lymneus palustris. *Brard*, p. 136. t. 5. f. 6, 7.

Lymnæa palustris. *Lamarch*, vi. ii. p. 160.

Stagnicola communis. *Leach, Mollusc.* p. 142.

Helix palustris. *Gmelin*, 3658.; *Mont.* p. 373. t. 16. f. 10.

Helix stagnalis, var. *Penn. B. Z.* 86. t. 13. f. 13.

——— limosa. *Linn. S. N.* i. 1249.?

Buccinum palustre. *Müller, Verm.* ii. 131.

Lymnea fragilis. *Kenyon, Mag. N. Hist.* ii. 425. f. e

Limneus communis. *Leach*; *Jeffreys, Linn. Trans.* xvi. 276.

Limneus tinctus. *Jeffreys*, l. c. 378—392.

Var. 1. apex decollated. *Mag. N. Hist.* vii. 161. f. 32.; *Linn. Trans.* viii. t. 5. f. 8. (See f. p. 231.)

In marshes and ponds.

Animal yellow-brown or cinereous, speckled with lighter colour.

Shell three quarters of and inch long, brown horn-colour, rather opake, suddenly sloping in a

conic manner, the volutions hardly raised, slightly striate longitudinally, and crossed with more remote transverse ones, like the facets of cut glass; aperture oval, covering nearly half the shell, often chocolate-brown and glossy in the inside, sometimes rosy about the pillar, where the peristome is spread and glossy, forming a slight umbilicus.

These shells vary very greatly in size; in their colour, from pale brown to dark violet-brown, and especially the colour of the throat, which is rarely bright violet-brown; in the thickness of the substance of the shell; and in the shape, occasioned by the different degrees of the ventricoseness of the whorls.

The smaller specimens often have their tips truncate. (See p. 231.) Mr. Alder thinks that var. β. of Mr. Jeffreys, which is found in rivers, frequently in the tide-way, and never has the size of those found in ponds, is intermediate between *L. palustris* and *L. fossarius*. Probably, the small size is produced by the current not allowing the animal its usual rest; we often regard a different habitation as a proof of a difference in species, while it may be the cause of the variation.

The eggs are like those of *L. stagnalis*. (See *Pfeiffer*, t. 8. f. 18.)

92. 5. LIMNÆUS *truncatulus*. Ditch Mud Shell. (t. X IX. f. 108.) Shell oblong-oval, pointed, brittle, perforated, with six or seven rounded and deeply divided volutions, striolate longitudinally and across; mouth ovate-oblong.

Limneus minutus. *Drap*. p. 53. t. 3. f. 5, 6.; *Alder*, l. c. 115.

Limneus fossarius. *Turton, Man.* ed. 1. 124. f. 108.

Lymneus minutus. *Brard*, p. 138. t. 5. f. 8, 9.

Lymnæa minuta. *Lamarck*, vi. ii. p. 162.

Stagnicola minuta. *Leach, Mollusc.* p. 143.

Helix fossaria. *Mont.* p. 372. t. 16. f. 9.

Lymnæa fossaria. *Flem.*

Buccinum truncatulum. *Müller, Verm.* ii. 130.

Limneus truncatulus. *Jeffreys, Linn. Trans.* xvi. 377.

Bulimus truncatus. *Brug. E. M.* 20.

Limnæus minutus. *Rossm. Icon.* i. 100. t. 2. f. 57.

Helix truncatula. *Gmelin*, 3659.

Bulimus obscurus. *Pioret, Prod.* 35.

Limnophysa minuta. *Fitz*, 113.

Var. 1. Conic-oval, less glossy brown and smooth. *Drap.* p. 53. t. 3. f. 7.

Monstrosity with the lower volution flattened at top, in the centre of which are sunk the other volutions.

In marshes and ditches, on the mud.

Animal greyish or dusky.

Shell half an inch long, pale brown or greyish, and is readily distinguished from the last by the rounded and deeply divided volutions; aperture nearly half as long as the shell, the outer lip a little reflected but not spread, nor glossy.

These animals are extremely variable in size and colour, according to the locality in which they are found, and the abundance of their food.

Mr. Alder observes, that a variety of a much smaller size is found on the margins of rivers, and another is found in mountain streams.

I have not been able to determine the *Turbo auricularis* Montagu T. B. 308., said to resemble *H. fossaria*, but with a rather ear-shaped mouth, found on the shore near Southampton. Can it be a *Lacuna?*

93. 6. LIMNÆUS *glaber*. Eight-whorled Mud Shell. (t. 9. f. 106.) Shell elongated, oblong-cylindrical, tapering, brittle, pellucid, yellowish white, with seven or eight convex volutions, and the aperture elongate-ovate.

Limneus elongatus. *Drap.* p. 52. t. 3. f. 3, 4. (bad); *Alder*, l. c. 115.; *Turton*, *Man.* ed. 1. 122. f. 106.
Limnea elongata. *Sowerby*, *Gen.* f. 6.
Limnæus elongatus. *Rossm. Icon.* i. 101. t. 2. f. 58.
Stagnicola octanfracta. *Leach*, *Mollusc.* p. 141.
Helix octanfracta. *Mont.* p. 396. 588. t. 11. f. 8.
—— peregrina. *Dillwyn*, p. 954.
—— octona. *Penn. B. Z.* ii. t. 86. f. 135.
Buccinum glabrum. *Müller*, *Verm.* ii. 135.
Monstrosity, the outer lip, with a thick white internal rib.
Lymnæa leucostoma. *Lamarck*, vi. ii. p. 162.
Bulimus leucostoma. *Poiret*, *Prod.* 37.
Var. 1. Spire elongate, twisted.
Var. 2. Apex of spire truncated or decollated.
In stagnant waters.
Animal blackish or dusky.

Shell an inch long, regularly tapering, with the ultimate volution not larger in proportion than the rest; spire composed of seven or eight tumid volutions, on the larger of which are often a few transverse striæ, and all of them obscurely striate longitudinally; aperture narrow oval, not a third part as long as the spire, with the pillar spread and white, but not forming an umbilicus.

It varies in the convexity of the volutions, and their number, as we have them from different waters with from six to nine.

This animal, like the other species, but perhaps more frequently, forms a thick white internal rib to the outer lip, just within the edge.

Mr. Jeffreys (*Linn. Trans.* xvi. 178.) placed in this genus *Assiminia Grayana*, a Ptenobranchous Mollusc, and *Helix detrita*, which is an exotic terrestrial species.

2. Amphipeplea *Nilson.* (Membrane Shell.)

The animal very like *Limnæus*, but the edge of the mantle is lobed and produced, so as to cover (when the animal is expanded) the oval, very thin, nearly membranaceous, flexible shell, which, like *Limnæus*, has a plait on the pillar lip; its axis and part of the body whorl is covered with an expansion of the inner lip.

Müller, Montagu, and Nilson, give a good description of this animal. Draparnaud considered the part of the mantle which is reflected over the shell to be a viscid coat.

Captain Brown, apparently not aware of the prior name, has called this genus *Lutea*, a name that is quite inadmissible.

94. 1. Amphipeplea *glutinosa.* Glutinous Membrane Shell. (t. 9. f. 103.) Shell semiglobular, ex-

tremely thin and inflated, amber-coloured; spire with three scarcely produced volutions.

Limneus glutinosus. *Drap.* p. 50.; *Turton, Man.* ed. 1. 120. f. 103.; *Jeffreys, Linn. Trans.* xvi.; *Michaud,* t. 16. f. 13, 14.
Limnea glutinosa. *Sowerby, Gen.* f. 5.
Myxas Mulleri. *Leach, Mollusc.* p. 149.
Helix glutinosa. *Mont.* p. 379. t. 16. f. 5.
Buccinum glutinosum. *Müller, Verm.* ii. 129.
Amphipeplea glutinosa. *Nilson, Moll. Suec.* 58.; *Rossm. Icon.* i. 93. t. 2. f. 48.

In stagnant ditches, England, Ireland. Locally and periodically abundant.

Montagu described the animal as large in proportion to its shell, like many of the *Bullæ,* and he thinks it might be placed in that genus. It is covered with a tenacious slime, and is of a pale dull yellow colour, sprinkled with bright brimstone spots; the tentacles are very broad at the base, and flat; eyes small, placed at the base of the tentacula on the inside; front broad; the foot spread and moderately long: when the membrane that usually covers the shell is withdrawn, the colour of the animal beneath the transparent shell gives it an appearance of highly polished tortoise-shell.

Shell about half an inch in diameter, extremely thin and transparent, of an amber or yellowish horn-colour, somewhat orbicular, with the outer lip much expanded; spire consisting of three and a half volutions; the smaller one lying nearly flat on the larger one, marked by a deep suture, and ending obtusely; the larger volution regularly striate; pillar without umbilicus.

This shell appears to have a very extended range, being found in Sweden in the north, and Syria in the south.

95. 2. AMPHIPEPLEA *involuta*. Involuted Membrane Shell. (t. 12. f. 147.) Shell ovate, subglobose, truncated, thin, transparent, very brittle; spire flat, of three or four very gradually enlarging whorls.

Limneus involutus. *Harvey; Thompson, Linn. Trans.* 1834; *Alder, Cat.*

Inhab. lakes—Ireland.

Shell very thin, and polished like the former, but is easily distinguished from it by its more ovate shape and truncated tip, produced by the flat or sometimes slightly concave form of the spire. It is easily known from *Physa fontinalis*, which it greatly resembles, in not being reversed, by the peculiar form of the spire, and the plait on the pillar lip.

On my writing to Mr. Thompson, of Belfast, respecting this shell, he has kindly furnished me with the following particulars, which I print entire:—

"Limneus involutus. *Harvey MSS.* Spire sunk within the outer whorl; aperture very large, extending to the apex.

"A few specimens of this beautiful shell were collected by my friend William Henry Harvey, Esq., of Limerick, in a small alpine lake on Cromaglaun mountain, Killarney, in the month of April, 1832; and believing them to be of a new species, were by their discoverer designated by the above name.

"Of three specimens sent to Belfast by Mr. Harvey, and contained in my own cabinet and in those of

Dr. Drummond and Mr. Hyndman, the largest is 5½ lines in length and 3½ in breadth; volutions 4, the largest enveloping the other three, none of which are visible in the profile of the shell; aperture very large, wide at the base (showing the columella throughout its entire length), and extending to the apex; margin reflected only where it joins the pillar.

" Shell polished, extremely thin, of a pale amber-colour, with coarse longitudinal striæ. It approaches *L. glutinosus* more nearly than any other species; but in consequence of the aperture extending to the apex, has, at a cursory view, a greater resemblance to *Bulla akera* than to any other British shell, their similarity being rendered still more striking by the columella having the same appearance in both species.

" The above description was read to the Linnæan Society, April 15th, 1834. To the present time (September, 1839), I have not heard of the species being obtained in any other locality in Ireland. With Robert Ball, Esq., of Dublin, I visited the lake or tarn on Cromaglaun mountain, in June, 1834, when we procured only a few small specimens; the time, however, was unfavourable for seeing the object of our search to any advantage, being at a very early hour of the morning, before the warmth of the sun had tempted any of them to leave the bottom of the lake or adjoining rivulet.

" This Mollusk probably belongs to Nilson's genus *Amphipeplea.*"

I am indebted to Mr. Ball for the specimen figured; it is evidently a very distinct species.

** *Tentacles compressed, triangular, with an auricle at the base; shell conical, apex subspiral.* (Ancylina.)

3. ANCYLUS. (River Limpet.)

Animal conical; body attached to the foot the whole length, and covered with an ovate, conical, simple, shell which is bent to the right, with a central posterior, rather obliquely recurved tip; the cavity with a lunate, submarginal scar, interrupted on the left side, for the passage of the air-tube to the lungs.

So called from the close connection by which the circumference of the shell is fixed to its attachment; or perhaps from the conical point, resembling the handle of a cover; in which case it should be written *Ansulus* or *Ansylus*.

The shell differs from *Siphonaria*, with which alone it can be confounded, on account of the peculiar form of the muscular scar, and the lateral situation of the apex; in being thin and pellucid, only finely striated, and covered with a thin olive periostraca.

It only agrees with *Patella* in the outward appearance of the shell, for in that genus the apex is anterior, and in this it is posterior, as in most Univalves.

This animal has been moved from one family, and even order, to another, as naturalists have settled among themselves, whether it breathed by gills or lungs. Rang places it with the *Pleurobranchi*, and, observes that it lives on stones and aquatic plants, but that he never observed it to breathe free air. Mr. Guilding (*Zool. Journ.* iii. 335.) and Treviranius (*Journal Phys.* 1832, t. 17.), who published a detailed dissection of the genus, mistake the valve which closes the opening of the breathing cavity for a gill. The head is quite destitute of the labial appendages noticed by Rang.

Mr. Berkeley (and my own observations bear out his accuracy) observes, that the animal is undoubtedly one of the *Limnæidæ*, and nearly allied to *Physa*. The pulmonary cavity, like that of *Physa*, is on the left side, with a valvular margin, in one corner of which is situated the rectum; between this and the foot is the orifice of the matrix. They are hermaphrodite, and may be observed in connection, as was observed by Lister (*Anim. Ang.*), about the end of September; and, as the latter author affirms, they fix their spawn on stones in small gelatinous globules, each containing many small eggs. (*Pfeiffer*, t. 161. f. 21.) They have a retractile (and not exserted, as described by Guilding) male organ at the base of the left tentacle.

These animals sometimes swim about on the surface of the water, like *Limnæi*, with the backs downwards. In fact they are *Limnæi*, with very short conical, instead of long spiral bodies.

Mr. Jeffreys doubts their being Pneumonobranchous, and Dr. Fleming, in one of his works, refers them to the genus *Crepidula!* and in his *British Animals*, to the *Pulmonifera*. The tongue is a broad spiral band, twisted at the end, longitudinally keeled, and set with numerous close cross-bands of minute, close set, equal, short triangular spines, directed backwards, and furnished with a simple membranaceous margin on each side, half as broad as the tongue itself; the stomach very much resembles the gizzard of a fowl, has a strong muscular band on each side, and is nearly filled with small flinty particles.

It is no proof that the animals do not breathe free air, because they are usually observed attached to stones, like *Patellæ*, at the bottom of the water; for *Limnæus pereger* is more frequently found at the bottom of the water on the mud than in any other place; and I have seen a specimen on exactly the same place for several days, without moving. But the *Ancyli* are often found, as has been observed by Mr. Jeffreys, out of the water, and only within reach of the spray of a water-fall.

These animals are very vivacious, for a specimen lived and moved about for an hour and more after its shell had been completely removed.

96. 1. ANCYLUS *fluviatilis*. Common River Limpet. (t. 10. f. 125.) Shell conoid, with the point recurved and near one end; aperture roundish-oval; disk blueish.

Ancylus fluviatilis. *Müller*, *Verm.*; *Drap.* p. 48. t. 2. f. 23, 24.; *Brard*, p. 200. t. 7. f. 3.; *Sowerby*, *Gen.* fig. 1.; *Turton*, *Man.* ed. 1. t. 140. f. 125.

Patella fluviatilis. *Lister*; *Mont.* p. 482.

—— – lacustris. *Turt. Dict.* p. 138.

Crepidula lacustris. *Fleming*, *Ency.*

b. With slight longitudinal striæ.

In streams and rivulets, attached to stones.

Animal greyish.

Shell about a quarter of an inch in diameter, and nearly as much in height, semitransparent, light horn-colour, covered with a dusky green skin, slightly marked with concentric striæ, inside bluish-white, glossy; the crown slightly curved downwards.

M. Michaud has described a specimen which has a sinus on the front edge, most probably caused by the animal having lived on a stone which had a prominence, under the name of *Ancylus sinuosus*. (*Compl.* 90. t. 16. f. 1, 2.)

VELLETIA. (Lake Limpet.)

The animal like *Ancylus*, but dextral; the shell oblong, compressed, conical, with the apex rather behind the middle, bent to the left, as in other dextral shells; mouth elongate.

97. 2. VELLETIA *lacustris*. Oblong Lake Limpet. (t. 10. f. 126.) Shell oblong, compressed, with the point slightly recurved in an oblique direction and nearly central.

Ancylus lacustris. *Müller*, *Verm.* ii. 199.; *Drap.* p. 47. t. 2. f. 25—27.; *Sowerby*, *Gen.* f. 2.; *Turton*, *Man.* ed. 1. 141. f. 126.

Patella lacustris. *Montagu*, p. 484.; *Don. B. S.* t. 150.

Patella oblonga. *Lightfoot*, *Phil. Trans.* lxxvi. 168. t. 2. f. 1. 5.; *Turt. Dict.* p. 138.

Crepidula oblonga. *Fleming*, *Ency.*

In still waters, attached to aquatic plants.

Animal blackish.

Shell a quarter of an inch long, and hardly a tenth in breadth, extremely thin and transparent, smooth, oblong, compressed at the sides, with the apex pointed and near the centre of the shell, inclining towards the narrower end, and turning a little obliquely towards the left side.*

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* Mr. Guilding (*Zool. Journ.* iii. 535.) has described two West Indian species of this genus, which I have lately had the opportunity of re-examining and proving to be true *Velletiæ*, which was doubtful from Mr. Guilding's erroneous description of the animal.

* * * *Tentacles elongate, linear ; body and shell spiral, sinistral.* (Physina.)

4. Physa. (Bubble Shell.)

The body spiral, on the middle of an elongate foot; the mantle large, lobed on the edge, and expanded over the ovate, thin, transparent, spiral, sinistral shell, which has an oblong mouth, with the inner lip expanded and spread over the body whorl, covering the axis and the smooth pillar; the tentacles have an auricle at the base.

98. 1. Physa *fontinalis.* Stream Bubble Shell. (t. 9. f. 110.) Shell horn-colour, oval, with a very short obtuse spire; aperture dilated at the base.

Physa fontinalis. *Drap.* p. 54. t. 3. f. 8, 9.; *Brard,* p. 167. t. 7. f. 7, 8.; *Lamarck,* vi. ii. 156.; *Leach,* 150.; *Jeffreys, Linn. Trans.* xvi. 379.; *Turton, Man.* ed. 1. 127. f. 110.

Limnea fontinalis. *Sowerby, Gen.* f. 8.

Bulla fontinalis. *Mont.* p. 226.

Bulimus perda. *O. F. Müller, Naturfoscher* xv.

Planorbis bulla. *Müller, Verm.* ii. 167.

Bulla fluviatilis. *Turton, Conch. Dict.*

Helix bullæoides. *Donovxn, B. S.* t. 168 f. 2. ??; *Linn. Trans.* viii. p. 126. t. 4. f. 1.

Var. 1. Spire longer.

Bulla fontinalis. *Linn. Trans.* viii. 126. t. 4. f. 1. (not description).

Physa acuta? *J. Sowerby,* not *Drap.*

Var. 2. Last whorl rather angular behind.

Physa alba. *Jenyns, MSS.,* not *Turton.*

In rivers and streams, on aquatic plants.

Animal blackish grey; tentacles paler.

Shell nearly half an inch long, and half as much broad, very thin and fragile; spire extremely short, of four volutions, the lower one much inflated, the others small, and ending obtusely; aperture covering nearly the whole of the shell; pillar slightly sinuate and white, not reflected.

This shell varies considerably in shape. Mr. Jeffreys distinguished four varieties. Some have the spire elongated considerably more than the rest. Dr. Turton (*Conch. Dict.*) described a small subglobose specimen under the name of *Bulla fluviatilis*, but it probably is only a young specimen of the common state.

It is the young specimens of these shells alone which agree with the Linnæan and Lamarckian character of the species, in the shortness of the spire; for, as the shell increases in size, the whorls are gradually turned more obliquely down the axis, so that the older shells have a longer spire in proportion than the young ones.

There are nevertheless two very distinct varieties, which may prove to be distinct species, and indeed have been considered so by several of my friends, as Mr. Fryer and Mr. Hinch, who study these animals. The one which agrees best with Linnæus's and Lamarck's character of *Physa fontinalis*, is generally a small shell, of a clear yellow colour, with a very short rounded spire, formed of 3½ or 4 very gradually enlarging whorls, the suture of the last being more oblique than the rest, and with a subacute tip. It is a young shell of this variety that was most probably figured by Donovan under the name of *Helix bullæoides*

(*British Shells*, t. 168. f. 2.), and *Bulla fluviatilis* by Dr. Turton, in his Dictionary, p. 27. It is a large specimen of this variety at fig. 110.; and others with a rather longer spire, as if passing into the next variety, that is figured by Lister, t. 134., by Da Costa, t. 5. f. 6.

The second variety, which is perhaps *Physa subopaca* of Lamarck, is a larger shell, often reaching 3-8ths of an inch in length, which is most probably described by Montagu and Turton as the adult of the former variety; for, they say, it sometimes reaches half an inch long. It is easily known from the former by the spire being produced about 1-3d the length of the mouth, and formed of four or five distinct convex whorls; and it has a blunt top.

This variety is called *Physa rivalis* by the Yorkshire conchologists, but is quite distinct from the West Indian species described by Dr. Maton. It is figured in Dr. Maton and Racket's paper (*Linn. Trans.* xviii. t. 4. f. 1.) as *Bulla fontinalis*, but does not agree with his description of the species, which certainly belongs to the first variety. This figure does not represent the inner lip sufficiently spread on the body whorl. The difference in the bluntness of the spire between the two varieties, at first made me much inclined to consider them as species; but the spaceous specimen I have examined, and the variation that I found in the specimen sent to me under the two names, induce me for the present to consider them as only variations of the same, probably produced by some local situation, as the difference in the depth of the water, or its being still or running. Mr. Hinch informs me, the first variety is always found in very small plashes of water, or in water among grass, while the larger one is found in canals and nearly still rivers, which may account for all the difference between them; for we have often been inclined to consider varieties as distinct, because they were found in different situations, whereas the difference of situation may be the only cause of the variation; which would probably disappear if they were placed and allowed to breed in similar circumstances to the other variety.

Mr. Jenyns informs me, that he has a British specimen, which he thought was the *Physa alba* of Turton (which is undoubtedly a Sicilian species), differing from the general form of *Physa fontinalis* in the hinder part of the last whorl being rather angular, as in *Limnæus stagnalis.*

Mr. James Sowerby has sent me a specimen of the long-spired variety, under the name of *Physa acuta ?*, which he received with *Chara aspera* from Anglesea, in 1833, and which he has continued to breed in his water-butt; but he says it differs from the common species in the form of the animal, which he thus describes: —

> "PHYSA (*acuta ?*). Animal with setaceous antennæ; an acute tail keeled upon the back; a two-lobed mantle, of which one of the lobes covers the columella, and is five-parted, the other is turned upon the spire, and is three-parted."

The animal has the habit of throwing its shell about in an extraordinary manner, either in defence or to remove obstructions, continuing at the same time fixed by its foot. Probably this motion is sometimes occasioned by a minute worm (the *Gordius inquitinus* of Müller) which infests this and many other fresh-water shells: twenty or more may sometimes be seen attached to their sides like thin threads.

The eggs are similar to those of *Planorbis* and *Limnæus*, in groups forming oblong or rather depressed globular masses, attached to the surface of leaves. (See *Pfeiffer*, t. 8. f. 1—8.; see also *Jeffreys*, *Linn. Trans.* xvi. 380.)

5. Aplexus *Fleming*. (Aplexus.)

Animal exactly like *Physa*, but the mantle edge is simple and not reflected over the shell, and the tentacles are without any auricle at the base; the shell is longer, and the inner lip is parallel to the outer, and not spread over the body whorl.

Adanson first described this genus in 1757, under the name of *Bulin* (Bulinus), which ought to be adopted; but it would create confusion, as Hartmann and Mr. Broderip have lately changed Lamarck's genus *Bulimus*, which is synonymous with *Cochlea* of Adanson, into *Bulinus*.

99. 1. Aplexus *hypnorum*. Slender Aplexus. (t. 9. f. 113.) Shell horn-colour, oblong, with an elongate pointed spire; aperture oval-lanceolate.

Physa hypnorum. *Drap.* p. 55. t. 3. f. 12, 13.; *Turton*, *Man.* ed. 1. 129. f. 113.

Limnea turrita. *Sowerby*, *Gen.* f. 10.

Bulla hypnorum. *Linn. S. N.* i. 1185.; *Mont.* p. 228.

Nauta hypnorum. *Leach*, *Mollusc.* p. 152.

Planorbis turritus. *Müller*, *Verm.* ii. 169.

In ponds and slow streams.

Animal blackish; foot quite as long as the shell; tentacles black.

Shell half an inch long, and a third part as broad, dark horn-colour, glossy and transparent; spire composed of five or six produced and hardly raised volutions, ending rather acutely; aperture narrow-oval, covering about half the shell; the pillar a little sinuate, often of a pale rose-colour.

The eggs are deposited in oblong masses, exactly similar to those of *Limnæus*, slightly attached to shells and water-plants. (See *Pfeiffer*, t. 7. f. 24. 27.)

This species was first recorded as British by the industrious Petiver (*Gaz.* t. 10. f. 8.), who found it at Mitcham, Surrey.

* * * *Tentacles elongate, linear; shell discoidal, sinistral.* (Planorbina.)

6. Planorbis. (Coil Shell.)

The animal with a small foot; tentacles with an auricle at the base, and a long slender subcentral spiral body, which is covered with an external discoidal dextral shell, the whorls rolling nearly on the same plane; with a lunate or subquadrate mouth, and a simple cavity.

In considering these shells as sinistral, the spire is that side which is uppermost when the mouth is placed on the right side of the spectator, with the most expanded part of the outer lip downwards. It is important to observe this distinction, for Dr. Turton and others, in describing the species, have sometimes called the under side the upper, and *vice versâ*.

This genus is so named from the flattened and horizontal coil of the volutions, by means of which the whole of the gyrations may be seen on each of the sides.

The smaller species are liable to many distortions. Mr. Sheppard describes a specimen of *P. marginatus*, with the volutions nearly disjointed or pulled out; another of *P. spirorbis*, in which the volutions appeared as if pressed out from the base towards the apex, and being almost disjointed, caused the shell to resemble a little basket; another, of *P. vortex*, with the mouth enlarged, and turned over the preceding whorls, which gives the idea of a serpent coiled up. (*Linn. Trans.* xvi. 157.) We have in the British Museum several specimens equally distorted.

The *Planorbes* have been considered by many authors as sinistral shells. M. Desmoulins (*Act. Soc. Linn. Bord.* iv. 273.) examined the question in detail, and came to the following conclusion.

1. That the shell of *Planorbis* is essentially dextral.

2. The upper part of the shell is invariably indicated by the more advanced edge of the mouth, and not by the sinking in of the tip of the spire, which sometimes does not exist. The monstrosities of these shells, which are not uncommon, also show this structure, as the whorls gradually glide from left to right, down the imaginary axis. (See *Michaud*, t. 16. f. 12.)

3. The animal has its three orifices on the left side of the neck, a character which distinguishes it from all the other dextral *Limnæadæ*. But this is only a displacement of the extremities of these organs, for the organs themselves are placed on the right side of the body, as in all the other dextral *Limnæadæ*.

4. Consequently, he adds, the animal of *Planorbis* is essentially dextral, like the shell.

5. The sinistral position of the orifices of the *Planorbis* is the same exception in the Pneumobranchous Mollusca, as the sinistral position of the gills of certain Ptenobranchous Mollusca is amongst the other genera of the order.

Mr. Benson observes,—"The animal is considered as sinistral; but if the shell be viewed as such practically, and placed with the side which would in a sinistral shell be accounted the apex, it will be found that the animal is on its back, and that it will have to twist its body half round, in order to gain the ground with its foot; and that, in order to creep with any ease, it must reverse the position of the shell. This is more especially observable in the flatter and more oblique mouthed species." Mr. Benson considers that face as containing the apex, which is contiguous to the back of the animal. This side may invariably be known in *Planorbis* by the greater projection of the lip in that part, by the deeper depression of the central umbilicus, and by the more considerable involution of the whorls, occasioning the greater depth of the suture. (*Journ. Asiat. Soc. Beng.* 1836, p. 744.)

* *Whorls not keeled, rounded above and below; spire flattish or slightly concave.*

100. 1. PLANORBIS *corneus*. Horny Coil Shell. (t. 8. f. 95.) Shell nearly flat above, deeply umbilicate beneath, showing the convex whorls; whorls six, rounded, striated; aperture semicircular.

Planorbis corneus. *Drap.* p. 43. t. 1. f. 42—44.;

Brard, p. 147. t. 6. f. 1, 2.; *Sowerby*, *Genera*, f. 1.; *Jeffreys*, *Linn. Trans.* xvi.; *Rossm. Icon.* ii. 14. t. 7. f. 113.; *Turton*, *Man.* ed. 1. 112. f. 95.

Helix cornea. *Linn. S. N.* 1243.; *Mont. Test. Brit.* 449.

Planorbis purpureus. *Müller*, *Verm.* ii. 154.

Junior, Planorbis similis. *Müller*, *Verm.* 166.

Helix nana. *Penn. B. Z.* t. 125.

In muddy streams and ditches.

Animal black. (*Sturm*, t. 40.)

Shell an inch in diameter, thick, black, or of a rusty brown colour, obliquely striate; volutions five, the outer one rounded, with a deep umbilicus on the under or front side, exposing three of the volutions; upper surface a little concave and whitish; aperture rather oblique, rounded, as high as broad.

The young shells are finely spirally striated.

101. 2. **Planorbis** *albus*. White Coil Shell. (t. 8. f. 97.) Shell thin, pellucid, white, concave, and with the whorls equally convex on both sides, with fine raised hispid spiral striæ; mouth roundish-rhombic.

Planorbis albus. *Müller*, *Verm.* ii. 164.; *Leach*, *Mollusc.* p. 156.; *Jeffreys*, *Linn. Trans.* xvi. 387.; *Turt. Man.* ed. 1. 114. f. 97.

Planorbis hispidus. *Drap.* p. 43. t. 1. f. 45—48.; *Brard*, p. 159. t. 6. f. 6, 7.; *Lam. Moll.* vi. 154.

Helix alba. *Mont.* p. 459. t. 25. f. 7.

——— spirorbis. *Linn. S. N.* i. 1244.?

Planorbis reticulatus. *Risso* ?

Var. Planorbis glaber. *Jeffreys*, *Linn. Trans.* xvi.; *Potiez and Michaud*, *Gall. Moll.* i. 211.

In stagnant waters, on aquatic plants.

Animal greyish. (*Sturm*, t. 42.)

Shell about a quarter of an inch in diameter, very thin and brittle, pale horn-colour, marked with very fine close-set raised circular striæ, which are clothed with deciduous bristles, and crossed with obscure longitudinal lines; volutions five, the first very large and rounded; the upper surface a little sunk in the middle, the under side more strongly concave; aperture roundish-oval, dilated, higher than wide, with the upper angle much produced.

When quite fresh, this beautiful species is clothed with a fine velvety pile composed of short points seated on the raised concentric striæ, and which fall off with the epidermis; and in its depilated state may be the *Helix spirorbis* of Linné, as he no where else mentions so very common a species, Gmelin having probably quoted it twice, both as *H. spirorbis* and *H. alba.* In this state it answers well to his character of *H. spirorbis*, in the *Fauna Suecica*, "testa utrinque concava, plana, albida: anfractibus quinque teretibus."

The *Helix Somershamensis* Sheppard (*Linn. Trans.* xvi. 159.), described as a land shell found on old decayed wood, is said much to resemble this species in shape and appearance. It requires further examination.

Mr. Alder observes, "The examination of Mr. Jeffreys' specimen of *P. glaber* confirms me in the opinion that it is a variety of this species. In some specimens of *P. albus* the spiral striæ are scarcely discernible even in a living state, and become quite obliterated in the dead shell." This is caused by the striæ being most prominent on the periostraca.

102. 3. **Planorbis** *lævis.* Smooth Coil Shell. (t. 12. f. 148.) Shell rather concave, and whorls equally convex on both sides; brownish horn-colour, semitransparent, smooth or slightly wrinkled by the lines of growth; with three or four compact and rounded whorls, and a nearly circular aperture.

Planorbis lævis. *Alder, Cat. Supp. Trans. Soc. Newcastle.*

Inhab. ponds, north of England,—Whitley, Northumberland, and Holy Island.

This very distinct species approaches nearest to *P. albus,* but is smaller, has the whorls more rounded and closer set, and is quite destitute of spiral striæ. It bears considerable resemblance to *Valvata cristata,* especially in its young state, and is often covered with a dark incrustation.

It was discovered by Mr. Alder and the Rev. W. Mark, in Sept. 1832, and first published by Mr. Alder in 1838. It is very like *P. spirorbis.*

Mr. Thompson has also found it at Belfast.

Very like *Planorbis parvus* of Say, from the United States.

103. 4. **Planorbis** *imbricatus.* Nautilus Coil Shell. (t. 8. f. 94.) Shell depressed, thin, pellucid, rather concave above, flattish beneath; whorls depressed, obtusely keeled, with spinous ridges across the outer whorl; aperture oval, united all round.

Planorbis imbricatus. *Müller, Verm.* ii. 165.; *Drap.* p. 44. t. 1. f. 49—51.; *Brard,* p. 163. t. 6. f. 10, 11.; *Jeffreys*, *Linn. Trans.* xvi. 388.; *Turton*, *Man.* ed. 1. 11. f. 95.

Helix nautileus. *Walker*, *T. M. R.* f. 20, 21.; *Mont.* p. 464. t. 25. f. 5.

Turbo nautileus. *Linn. S. Nat.* i. 1241.; *Turt. Dict.* p. 227.

Var. 1. Shell smaller, with the transverse laminæ more remote.

Planorbis cristatus. *Drap.* p. 44. t. 2. f. 1—3.

Var. 2. With the transverse laminæ obliterated.

Monstrosity, with the volutions detached and raised above each other.

In ponds and ditches, on aquatic plants.

Animal grey.

Shell the tenth of an inch in diameter, of a blackish or greenish horn-colour, with three volutions; the epidermis raised into numerous transverse ridges, which form a spinous crest round the outer margin; aperture roundish-oval, united all round, and often detached from the second volution at its narrower end.

* * *Spire flat; whorls flat above, keeled.*

104. 5. Planorbis *carinatus.* Carinated Coil Shell. (t. 8. f. 89.) Shell horn-colour, transparent, striate, nearly flat above, rather convex, and with a slight central umbilicus beneath; whorls six, rapidly enlarging, with a prominent obtuse keel in the middle; mouth angular.

Planorbis carinatus. *Müller*, *Verm.* ii. 157.; *Drap.* p. 46. t. 2. f. 13, 14. 16.; *Brard*, p. 150. t. 6. f. 3.; *Turton*, *Man.* ed. 1. t. 16. f. 89. (not 87.).

Helix planata. *Linn. Trans.* viii. p. 189. t. 5. f. 14.

Helix planorbis. *Linn. S. Nat.* i. 1242.; *Turton, Dict.* p. 45.

Helix complanata. *Mont. T. B.* 450. t. 25. f. 4.

Planorbis complanatus? *Turton, Man.* ed. 1. f. 89. (not description).

Var. 1. Planorbis disciformis. *Jeffreys, Linn. Trans.* xvi. 521.; *Alder, Mag. Z. & B.* ii. 113.

Planorbis lutescens. *Jeffreys, Linn. Trans.* xvi. 385. (not *Lam.*).

Helix carinata. *Mont. T. B.* 451. t. 25. f. 1.

Planorbis planatus. *Turton, Man.* ed. 1. 110. f. 92.

In stagnant waters.

Animal brown.

The animal, according to Montagu, differs from *P. marginatus* in the tentacles being somewhat longer, and particularly in their being pellucid, yellow, and not darker in the middle. (*T. B.* 453.; *Sturm*, t. 43.)

Shell hardly half an inch in diameter, with five volutions, the outer one growing suddenly larger, above nearly flat, beneath rather convex, gradually shelving to the outer edge; in the older specimens, the hinder or upper part of the whorls becomes rather convex; colour pale horn-colour and transparent, often covered with a brownish coat; aperture contracted to a point above, in consequence of the keel.

This species is immediately known from *Planorbis carinatus* by the under or front side of the whorls not being so convex and ventricose, by their shelving gradually to the outer edge, and by the hinder or upper part of the whorls of the older shells being rather convex, somewhat like the lower, which has caused the keel to be considered as central, which it is not.

Dr. Turton's figure of *Planorbis planatus* certainly represents this shell, and probably he only described a young specimen.

Draparnaud and Michaud believe that the *Helix contortuplicata* Gmelin, S. Nat. n. 144. (*Planorbe en vis* Geoff. 99. t. 3. f. 17, 18.) is only a monstrosity.

Mr. Sheppard describes a monstrosity which had the volutions nearly disjointed or pulledout. (*Linn. Trans.* xvi. 157.)

Mr. Alder observes, "I am not very sure, even after the examination of Mr. Jeffreys' specimen, that I perfectly understand the distinction between *Planorbis disciformis* and *P. carinatus.* The degree of carination is so very variable in different individuals of the same species, that it is rather fallacious as a distinguishing character." On re-examining the specimen here referred to, I could not find any character of importance to distinguish them; and Mr. Jeffreys says, "they are often found living mixed with *P. carinatus.*"

In the first edition of this work there was some mistake about the reference to the figures, perhaps occasioned by their being wrongly numbered by the engraver.

Planobis marginatus should have been 87, and not 88.

Planorbis complanatus should have been 88, and not 89.

Planorbis carinatus should have been 89, and not 87.

This is proved by the size he gives for *Planorbis complanatus.* Rossmäsler has partly corrected this error; he truly considers the *P. complanatus* of Turton, as only a state of growth of *P. marginatus.*

105. 6. **Planorbis** *marginatus*. Margined Coil Shell. (t. 8. f. 87, 88. 90.) Shell horn-colour, brown, semitransparent, striolate, flat or a little concave above, flattish, with a slight central concavity, beneath; whorls rapidly enlarging, flat, and strongly keeled above, ventricose and rounded to the margin beneath.

Planorbis marginatus. *Drap.* p. 45. t. 2. f. 11, 12. 15.; *Rossm. Icon.* ii. t. 2. f. 59.; *Brard*, p. 152. t. 6. f. 5.; *Alder*, *Mag. Zool. & Bot.* ii. 112.; *Turton*, *Man.* ed. 1. 107. f. 87.

Helix planorbis. *Linn. Syst.* i. 1242.? *Penn. B. Z.* ii. t. 83. f. 123.; *Linn. Trans.* viii. 188. t. 5. f. 13.

Helix complanata. *Linn. S. N.* i. 1242.?; *Mont.* p. 450. t. 25. f. 4.; *Fleming*, *B. A.* 278.

Planorbis umbilicatus. *Müller*, *Verm.* ii. 160.; *Jeffreys*, *Linn. Trans.* xvi. 384.

Planorbis carinatus. *Studer.*

——— complanatus. *Turton*, *Man.* ed. 1. 108. and f. 88. (not 89. as cited.)

Var. 1. Planorbis turgidus. *Jeffreys*, *Linn. Trans.* 384.

Var. 2. Helix rhombea. *Turton*, *Conch. Dict.*

Planorbis rhombeus. *Turton*, *Man.* ed. 1. 108. f. 90.

Planorbis Sheppardi. *Leach*, *Moll.* 149., and *Cab. Brit. Mus.*

Helix Draparnaudi. *Sheppard*, *Linn. Trans.* xiv. 158.; *Cab. Brit. Mus.*

Planorbis Draparnaldi. *Jeffreys*, *Linn. Trans.* xvi. 306.

Planorbis deformis. *Lam.* vi. 154.?

Var. 3. entirely without any keel. *Alder*, l. c. 113.

Monstrosity, with the volutions elevated into a spiral cone.

Helix terebra. *Turton, Dict.* p. 62. f. 55.

—— cochlea. *Brown, Wern. Trans.* ii. t. 24. f. 10.

In stagnant waters and slow rivers.

Shell about three quarters of an inch in diameter, very like the last, but thicker and the whorls more rounded, more convex to the edge beneath, and flatter at top or behind; hence the keel has been called marginal, and the mouth is more rhombic and rounded in front; these characters are quite as visible in the young shells. The keel greatly varies in distinctness and prominence, but is never so prominent as in the former species.

There is no doubt but that the *Helix rhombea* of Turton is only the young state of this species, and Dr. Leach's specimen of *Planorbis Sheppardi*, which is the type of Dr. Turton's *P. complanatus*, is evidently the same: his figure is half as large again as the specimens in the Museum. Mr. Sheppard thought it was allied to *P. albus*, and this, perhaps, misled Mr. Alder to think that it might be a variety of that species. (*Mag. Zool. & Bot.* ii. 113.)

Férussac thought that the *Helix rhombea* of Turton was probably a *Scalaris* monstrosity of *H. ericetorum*. (*Fér. Prod.*)

Dr. Fleming considered that the *Helix terebra* of Turton might be a distortion of *Helix lapicida*, but Dr. Turton has reduced it to this species.

106. 7. PLANORBIS *vortex*. Whorl Coil Shell. (t. 8. f. 91.) Shell brown, pellucid, thin, flat above, slightly and regularly concave beneath, with six or seven gradually increasing sharply keeled volutions, which are convex before and flat behind mouth rhombic, compressed.

Planorbis vortex. *Müller*, *Verm.* ii. 158.; var. *a.*, *Drap.* p. 44. t. 2. f. 4, 5.; *Brard*, p. 154. t. 6. f. 9.; *Lam. Hist.* vi. 154.; *Jeffreys*, *Linn. Trans.* xvi. 382.; *Rossm. Icon.* 104. t. 2. f. 61.; *Sturm*, *Fauna*, t. 44.; *Turton*, *Man.* ed. 1. 109. f. 91.

Helix vortex. *Linn. S. N.* i. 1242.; *Mont.* p. 454. t. 25. f. 3.

Helix planorbis. *Da Costa*, p. 65. t. 4. f. 12.

Planorbis compressus. *Michaud*, *Compl.* 81. t. 16 f. 6. 8.

Monstrosity. The mouth of the shell with a thickened internal rib.

Planorbis leucostomus. *Michaud*, *Compl.* 80. t. 16. f. 3, 4, 5.; *Rossm. Icon.* i. 105. f. 62.

In stagnant waters.

Animal violet-brown.

Shell three eighths of an inch in diameter, very flat and thin, with six or seven gradually increasing volutions, slightly concave above, and quite flattened underneath, so as to form a sharp edge round the outer volution; aperture a little angular.

In summer, when the ditches are dry, this animal closes up its shell with a white *epiphragm*, within which it lies secure under the mud and weed, in a state of torpidity, until the ditches are again filled with water. The animal then thickens the internal margin of the shell, forming a permanent white rim.

Müller long ago pointed out the white and thickened aperture as an occasional character of this shell, though he was not perhaps aware of the manner in which it was formed.

107. 8. **Planorbis** *spirorbis.* Rolled Coil Shell. (t. 8. f. 98.) Shell thin, brown, slightly concave on both sides, with six gradually increasing roundish and nearly equal volutions; mouth roundish.

Planorbis spirorbis. *Müller, Verm,* ii. 161.; *Brard,* p. 156.; *Turton, Man.* ed. 1. 115. f. 98.; *Sturm, Fauna,* t. 45.

Helix spirorbis. *Gmel.* i. 362.; *Mont.* p. 455. t. 25. f. 2.

Planorbis vortex β. *Drap. Moll.* 45. t. 2. f. 6, 7.; *Jeffreys, Linn. Trans.* xvi. 382.

In ponds and canals.

Shell in flatness and compactness of volutions much resembling the *P. vortex*; but is less and has only six volutions; is rather thicker; the upper surface is a little concave in consequence of the volutions being rounded, and the outer one scarcely flattened into a carinated edge; and the aperture is rounded below.

Mr. Alder now believes that *P. vortex* and *P. spirorbis* of Müller are distinct. (See *Alder, Cat. Supp.* 2.)

The peristome is often white-ribbed.

* * * *Shell polished; spire deeply umbilicate; whorls slightly keeled; front of shell convex.*

108. 9. **Planorbis** *nitidus.* Fountain Coil Shell. (t. 8. f. 93) Shell depressed, dark horn-colour, smooth, glossy, diaphanous, flat above, with a cen-

tral sunk spire, rather convex beneath; whorls three or four, the outer shelving to a keel in the middle; mouth elongate-angular.

Planorbis complanatus. *Drap.* p. 47. t. 2. f. 20—22. *Rossm. Icon.* ii. 16. t. 7. f. 116.; *Brard,* p. 161. t. 6. f. 4.

Helix fontana. *Lightf. Phil. Trans.* lxxvi. t. 2. f. 1.; *Montagu,* p. 462. t. 6. f. 6.

Planorbis nitidus. *Müller, Verm.* ii. 263. (part)—*Fleming, B. A.* 278.; *Jeffreys, Linn. Trans.* xvi. 389.; *Alder, Mag. Z. & B.* ii. 114.

Planorbis lenticularis. *V. Alten; Sturm, Fauna,* vi. 8. 16.

Planorbis fontanus. *Turton, Man.* ed. 1. 110. f. 93.

Helix lenticularis. *V. Alten,* 35. t. 2. f. 4.

In clear stagnant waters, on aquatic plants.

Animal black.

Shell not a quarter of an inch in diameter, of a dark or whitish horn-colour, very convex beneath, with the centre flattened, above flat, with a central umbilicus; the outer volution slightly but rather sharply carinate near the middle; the front of the shell is regularly convex, has the appearance of being the proper spire, as in *Segmentina.* This shell differs greatly in size and colour; the larger specimens are generally much the darkest, being often reddish brown.

* * * * *Spire deeply umbilicated; whorls rounded before and behind, not keeled, close pressed.*

109. 10. **Planorbis** *contortus.* Twisted Coil Shell. (t. 8. f. 96.) Shell deeply umbilicate above, nearly flat beneath; whorls eight, convex; suture deep; aperture very narrow crescent-shaped.

Planorbis contortus. *Müller, Verm.* ii. 162. *Drap.* p. 42. t. 1. f. 39—41.; *Jeffreys, Linn. Trans.* xvi. 383.; *Rossm. Icon.* ii. 16. t. 7. f. 117.; *Turton, Man.* ed. 1. f. 96.; *Brard,* p. 157. t. 6. f. 12—14.

Helix contorta. *Linn. S. N.* i. 1244.; *Montagu,* p. 457. t. 25. f. 6.

Helix umbilicata. *Pulteney, Dorset.* t. 20. f. 11.

—— crassa. *Da Costa, B. S.* t. 4. f. 11.

Inhab. ditches. Common.

Animal grey or blackish. (*Sturm,* t. 41.)

Shell about two tenths of an inch in diameter, and one tenth in thickness, brown horn-colour, and when free from accidental incrustations, exhibiting in water a bronzed or gilt lustre; volutions five, remarkably compact and equal in size; the upper surface with a large and deep umbilicus; aperture very narrow crescent-shaped, wider than high, only slightly produced on the under side.

In describing this shell, Dr. Turton called that the upper side which was considered the lower in the other species, and *vice versâ.*

7. SEGMENTINA *Flem.* (Segment Shell.)

Animal nearly like *Planorbis*, but the shell is polished, and the cavity contracted by permanent internal transverse ridges, having a triradiated opening.

So called from the internal segments or partitions.

Mr. Alder does not think that the septa in the shell are sufficient to raise it to the rank of a genus, as the animal is exactly like *Planorbis.* Müller confounded it as a variety with *P. fontanus:* like that species, the spire is umbilicated, and the front of the shell has the appearance of being the proper spire.

110. 1. SEGMENTINA *lineata.* Glossy Segment Shell. (t. 8. f. 91.)

Planorbis nitidus. *Müller*, ii. 163. (*part*); *Drap.* p. 46. t. 2. f. 17—19.; *Turton*, *Man.* ed. 1. 116. f. 91.; *Pfeiffer*, i. 82. t. 4. f. 12, 13.; *Rossm. Icon.* ii. 15. t. 7. f. 114, 115.

Hemithalamus lacustris. *Leach*, *Mollusc.* p. 137.

Nautilus lacustris. *Light. Phil. Trans.* t. xxvi. t. 1. f. 1—7.; *Mont.* p. 191. t. 6. f. 3.

Helix lineata. *Walker*, *Test. M. R.* t. 1. f. 28.

Planorbis clausulatus. *Férussac; Potiez & Michaud*, *Gall.* i. 209.; *Desmoulin*, *Mol. Girond.* n. 10.

Segmentina nitida. *Flem. Edin. Ency.* xii.

Helix nitida. *Gmel.* 3642.

Planorbis nautileus. *Kickx*, *Mol. Brab.* 66.

Segmentina lineata. *Flem. Mollusca*, *Ency. Brit.* t. 367. f. 8., *Brit. Anim.* 279.

In stagnant waters, on aquatic plants.

Shell hardly a quarter of an inch in diameter, highly polished and smooth, of a chestnut or reddish-brown colour, flattish and semitransparent; volutions four, the outer one very large in proportion, and marked with two or three whitish transverse lines exhibiting the internal partitions; the upper surface very convex, with a deep umbilicus in the centre, the under side nearly flat, and umbilicate in the centre; the circumference slightly carinate; aperture oval, inclining to triangular, with the peristome interrupted.

Except for its internal semiconcamerated partition, this shell exactly resembles the *Planorbis fontanus*, but is larger.

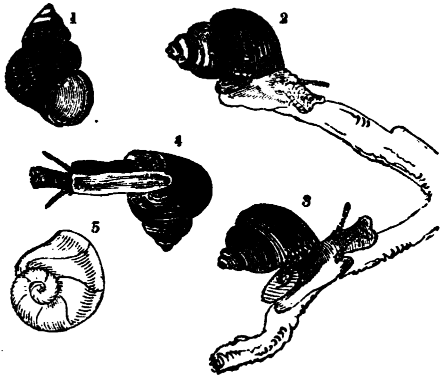
Sect. II. OPERCULATED. (*Operculata.*)

The mantle edge separate from the back of the neck of the animal, leaving an open pulmonary chamber; tentacles two, elongate, contractile, with the eyes on the outer side of their base. They are all diœcious, terrestrial, and furnished with a distinct operculum.

It contains only a single British genus, the type of a large family.

Fam. 1. CYCLOSTOMIDÆ.

Animal with a broad foot, a central spiral body, enveloped in a simple edged mantle, which is covered with an ovate spiral shell, with a roundish mouth, and furnished with a spiral operculum.



CYCLOSTOMA ELEGANS.

4 Showing the under side of the foot, divided into two parts.
5 The operculum.

These animals live an vegetable matter, like the snails, and are found in damp places on a chalky soil.

This family contain many foreign, and one British genus.

Mr. Jeffreys has placed this family in the same group with the *Carychiadæ* Leach (our *Auriculidæ*), overlooking all the peculiarities in the respiratory and sexual organs of the animal.

CYCLOSTOMA *Lam.* (Circle Shell.)

Shell ovate-spiral; mouth simple, united all round; operculum of a few flat whorls, with a simple shelly internal coat; the foot divided into two parts by a longitudinal central groove. (See fig. p. 273.)

The foot is formed of two longitudinal portions: as the animal walks, the portion on one side is first advanced, while the animal holds on by the other; and then holds on with the advanced portion as the other side is gradually advanced before it. (See p. 273. f. 4. *Rossmäsler*, *Icon.* i. 89. t. 2. f. 80. 82.)

This is the case with *Cyclostoma lineolata* and the exotic species with ovate, few-whorled opercula. The foot of the species with orbicular, horny, many-whorled opercula is not so divided, but broad and expanded, like the foot of other terrestrial Mollusca.

Dr. Turton, in his descriptions of this genus (ed. 1. 93.), says the shell has no epidermis; but this is a mistake: indeed, I am not aware of any shell that is really destitute of this important covering (see *Phil. Trans.* 1833); though it varies greatly in thickness in different genera; and in this genus it is very thin, but in some Indian species of the family it is thick, and forms a decided brown coat. In the same manner, he describes the operculum as horny. It is, as in most of the European species to which I am inclined to restrict the genus, decidedly shelly.

The generic name is from the circular circumference of the aperture or mouth.

111. 1. Cyclostoma *elegans*. Elegant Circle Shell. (t. 7. f. 75.) Shell conic-oval, with raised spiral striæ, and the peritreme attached at its upper part.

Cyclostoma elegans. *Drap.* p. 32. t. 1. f. 5. 8.; *Brard*, p. 103. t. 3. f. 7, 8.; *Linn. Trans.* xvi. f. 63.; *Turton, Man.* ed. 1. 93. f. 75.

Cyclostomus elegans. *De Montfort*, ii. p. 287.

Turbo elegans. *Mont.* p. 342. t. 22. f. 7.; *Linn. Trans.* viii. 167.

Turbo striatus. *Da Costa*, p. 86. t. 5. f. 9.

——- tumidus. *Penn.*

Nerita elegans. *Müller, Verm.* ii. 177.

Var. Smaller.

Cyclostoma marmoratum. *Brown?*

In hedges and under stones, in chalk and limestone districts; England and Wales, β Scotland, Edinburgh??

Animal grey-brown.

Shell half an inch long, and four tenths of an inch wide, solid, grey or purplish-yellow, mostly purple at the tip, often marked with two rows of purplish brown spots; spire composed of five rounded volutions, marked with numerous close-set raised spiral striæ and finer longitudinal ones between them; aperture round with a small angle at top, and an umbilicus behind the pillar; operculum hard, horny externally, and marked with a single depressed spiral line, from which some very fine striæ radiate towards the circumference.

The variety is much smaller in all its parts, and rather more finely striated.

Lister (*Tab. Anat.* iv. f. 1, 2, 3.) gives some account of the anatomy, and a very detailed description has lately been published by the Rev. Mr. Berkeley (*Zool. Journ.* iv. 278.).

Montagu gives a good description of the animal, but he thinks Lister was wrong in not describing the black tips to the tentacles as eyes, as well as the real eyes which are at their base. Time has proved, I think, that "his conjecture" was not just. Indeed the whole of Montagu's article on this animal is curious, as showing how desirous the older conchologists were to gain some knowledge of the animal of the shell they were describing, and to form theories from the few they then knew. (See *Test. Brit.* 346.)

Mr. Jeffreys has placed in this genus, as a Pneumonobranchous Mollusca, *Turbo truncatus* of Montagu, because he found it mixed with some other land shells in some fine sand from Weymouth. This is a marine shell belonging to the genus *Truncatella* of Risso, and respires by gills. (See *Berkeley*, *Zool. Journ.*)

CLASS II. CONCHIFERA *Lam.*

THE animals without any distinct head, the mouth being situate between the four leaf-like lips, with a more or less distinct, compressed, central foot, enveloped by the two pair of leaf-like gills and the large leaf-like mantle, which are covered by two shelly valves, which are united together by a ligament along their dorsal edge.

These animals are all aquatic and mostly marine; the British fluviatile species belong to one section and three families, viz:

I. DIMYARIA. *Shell oblong-longitudinal; animal with an anterior and posterior subequal adductor muscle.*

Fam. 1. *Cycladæ.*—Shell ovate, hinge with two or three diverging teeth. Mantles, lobes free beneath.

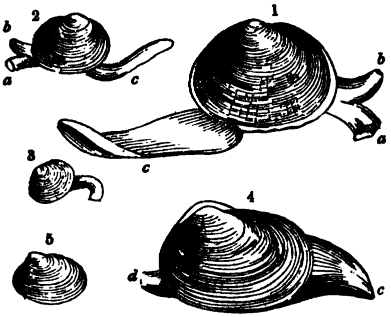
Fam. 2. *Unionidæ.*—Shell oblong, hinge toothless or with large lateral teeth. Mantle lobes free all round.

Fam. 3. *Driessenadæ.* — Shell triangular, hinge toothless. Mantle lobes united, pierced with three holes.

Fam. 1. CYCLADÆ.

Animal — the mantle lobes free beneath and in front, united behind, and extended into one or two siphons; foot compressed, subquadrate, or becoming strap-shaped.

Shell subcordate, porcellanous, thin, covered with a hard olive horny periostraca, hinge teeth two or three, diverging; lateral teeth distinct, laminar.



1. 3. Cyclas cornea.—*a* lower, *b* upper siphon; *c* the foot.
4. 5. Pisidium amnicum.—*d* the single siphon; *c* the foot.

These shells are distinguished from the marine *Veneridæ* by the shell being covered with a hard olive horny periostraca.

As Mr. Jenyns justly observes, in his excellent Monograph of the British species of this family, which has here been followed, that all the species breed readily in confinement, during the spring and summer months. They are probably ovoviparous, and the young appear to remain for a certain period within the folds of the branchiæ previous to their exclusion, since many may be found of different sizes within the parent at one and the same time. They have the faculty of producing long before they are arrived at their full growth; and even some individuals, which are themselves so immature as to possess hardly any of the distinguishing characters of the species, frequently contain young of a sufficient size to be seen from without through the transparent valves.

When kept alive, they readily and frequently ascend the sides of the vessel, and glide along the surface of the water, with their foot extended on it, and the shell immersed and in an inverted position. In this manner, like the *Limnæi* and other Gasteropodes, they contrive to traverse the vessel from side to side, as though they were crawling along a solid plane.

This family contains two genera: —

1. *Cyclas.* Shell oblong, subequilateral; animal siphons two. (f. 1—3.)
2. *Pisidium.* Shell ovate, inequilateral, wedge-shaped; animal siphon one. (f. 4, 5.)

1. CYCLAS *Lamk.* (Cycle.)

Animal — mantle produced behind into two elongate contractile siphons; foot tongue-shaped, very extensile; shell suborbicular, nearly equilateral; hind teeth minute, one in the right and two in the left valve; lateral teeth compressed, elongate, lamellar.

The shells are known from the next genus by their being rounder and more equilateral.

112. 1. CYCLAS *rivicola*. River Cycle. (t. 1. f. 1.) Shell subglobose-ovate, ventricose, rather solid, beautifully and closely striated, greenish brown, with two or three darker bands; edge and lunule yellow; umbones obtuse; cardinal ligament conspicuous.

Tellina cornea *β*. *Maton & Racket*, *Linn. Trans.* viii. 59.; *Turton*, *Conch. Dict.* 180.; *Wood*, t. 46. f. 3.

Cardium corneum, var. *Montagu*, *T. B.* 86.

Cyclas cornea. *Drap. Hist. Moll.* 128. t. 10. f. 1. 3.

Cyclas rivicola. *Leach*, *MSS.*; *Lam. Hist.* v. 558.; *Pfeiffer*, *L. & W.* 121. t. 5. f. 3. 5.; *Turton*, *Bivalves*, 248. t. 11. f. 13.; *Fleming*, *Brit. Anim.* 452.; *Jenyns*, *Trans. Camb. P. S.* 6.; *Turton*, *Man.* ed. 1. 12. f. 1.

Young, compressed, pale.

Cyclas æquata. *Sheppard, MSS. Brit. Mus.*

Inhab. river Thames, Trent, &c.

The shell is rather solid, blunt within; the umbones paler, and often circumscribed with a dark line; length 10½, height 8½, thickness 6½ lines.

113. 2. Cyclas *cornea*. Horny Cycle. (t. 1. f. 2.) Shell suborbicular, globose, thin, very finely striated; umbones blunt; ligament inconspicuous.

Tellina cornea. *Linn. S. N.* i. 1120.; *Linn. Trans.* viii. 59.; *Don. B. S.* t. 96.

Nux nigella. *Humph. Cat.*

Tellina rivalis. *Müller, Verm. Hist.* ii. 202.

Cardium corneum. *Mont. T. B.* 86.

——— nux. *Da Costa, B. S.*

Cyclas cornea. *Lam. Hist.* v. 558.; *Pfeiffer*, 120. t. 5. f. 12.; *Nilson, Moll. Suec.* 96.; *Turton, Biv.* 248. t. 11. f. 14.; *Man.* ed. 1. 13. f. 2.; *Flem. B. A.* 452.; *Jenyns*, l. c. 8.

Inhab. rivers, ponds, and ditches.

Var. 1. stagnicola. Shell subglobose, rather flattened on the basal edge; umbones tumid, pellucid, very prominent.

Tellina stagnicola. *Shepp. Linn. Trans.* xiv. 150.

Cyclas stagnicola. *Leach, MSS. Brit. Mus.*

——— cornea β. *Jenyns*, l. c. 8.

Var. 2. gibbosa. Shell very gibbous; margin very blunt.

Var. 3. compressa. Shell rather compressed; the margin meeting at an acute angle.

Var. 4. minor. Small, nearly globular.

Inhab. turf-pits, fens of Cambridgeshire.

Animal white; the siphons rather elongate, pale flesh-coloured, upper rather tapering, lower cylindrical, truncated; foot, when expanded, rather longer than the shell.

114. 3. Cyclas *lacustris*. Capped Cycle. (t. 1. f. 3.) Shell rather rhombic, compressed, thin, yellowish white, diaphanous; umbones prominent, rather acute, and tuberculose; ligament inconspicuous.

Cardium lacustre. *Mont. T. B.* 89.

Tellina lacustris. *Linn. Trans.* vii. 60.; *Turton, C. D.* 180.

Cyclas calyculata. *Drap.* 130. t. 10. f. 13, 14.; *Lam. Hist.* v. 559.; *Pfeiffer*, 122. t. 5. f. 17, 18.; *Nilson*, 99.; *Turton, Man.* ed. 1. 14. f. 3.

Cyclas lacustris. *Turton, Biv.* 249. t. 11. f. 18.

Young. The apex of the shell large relatively to the size of the specimen.

Inhab. rivers.

Var. 1. Shell orbicular, less compressed, subdiaphanous, reddish brown.

Cyclas lacustris. *Alder, Cat.* i. 40., *Brit. Mus.*

—— calyculata β. *Jenyns*, l. c. 11.

Inhab. ponds.

Var. 2. Shell orbicular, rhombic, rather ventricose, subdiaphanous, reddish; umbones less prominent, blackish.

Cyclas stagnicola. *Leach, MSS. fide Lam.*

—— calyculata, var. 2. *Lam. Hist.* v. 559.

—— ——— γ. *Jenyns*, l. c. 11.

Inhab. north of England. (*Jenyns.*)

Animal white; siphons white, elongate.

This species, when in confinement, shows more activity than *C. cornea;* they sometimes remain at the bottom of the vessel with the posterior extremity of the shell elevated, and the siphons exserted.

The cup, or swollen part of the umbo, in the ventricose shell of the young animal remaining on the top of the shell, is common to several species of the family, and which, like many other viviparous Mollusca, produce their young of a large size, compared to their parent.

2. Pisidium.

Mantle extended behind into a short, simple, contractile siphon; foot tongue-shaped, very extensile; shell suboval, wedge-shaped, inequilateral; hinge teeth and lateral teeth like *Cyclas*.

This genus was first distinguished by Scopoli: it has since been established, from characters drawn from the animal by Pfeiffer, under the name of *Pisidium*. Leach long ago separated it in his MSS. under the name of *Pera*, and afterwards of *Euglesia*, and the shells, with his names attached to them, were long exhibited in the British Museum collection.

* *Shell slightly inequilateral.*

115. 1. Pisidium *obtusale*. Gibbous Pera. (t. 12. f. 149.) Shell globose, obliquely subovate, shining, very finely striated, greenish black, with a yellowish marginal zone, rarely all yellowish; umbones rather prominent, very blunt.

Pisidium obtusale. *Pfeiffer*, 125. t. 5. f. 21, 22.; *Jenyns*, l. c. 13. t. 20. f. 1. 3.

Cyclas obtusalis. *Lam. Hist.* v. 559.

Pera gibba. *Leach, MSS. Brit. Mus.*

Young. The yellow zone broader.

Var. 1. Shell ovate, trigonal, very ventricose, blackish or ochraceous; the edge very blunt.

Cyclas obtusalis. *Nilson*, 101.

——- obtusale β. *Jenyns*, l. c. 13.

Inhab. small splashy pools and other stagnant waters.

Animal white; siphons short, obconic; foot very extensile.

Mr. Jenyns observes, "It is by far the most active and lively species that I am acquainted with, being always in motion, and residing less at the bottom than the rest of the family."

116. 2. Pisidium *nitidum*. Shining Pera. (t. 12. f. 150.) Shell orbiculate, oval, very shining, finely striated; umbones rather blunt, with a few deeper striæ.

Pisidium nitidum. *Jenyns*, *Monog*. 16. t. 20. f. 7, 8.

Inhab. clear water, Cambridgeshire, Battersea Fields.

Animal white; siphon short, funnel-shaped, with a spreading mouth, and a more or less plaited crenated edge.

This shell may easily be distinguished by the deeper grooves on the umbo, which are more easily seen in the living specimens.

117. 3. Pisidium *pusillum*. Minute Pera. (t. 1. f. 7.) Shell orbicular, ovate, rather compressed, very finely striated, scarcely inequilateral; umbones rather prominent.

Tellina pusilla. *Turton*, *C. Dict.* 167.

Cyclas pusilla. *Turton*, *Biv.* 251. t. 11. f. 16, 17., *Man.* ed. 1. 16. f. 7.

Cyclas fontinalis. *Nilson*, 101.; *Drap*. 130. t. 10. f. 8. 11.

Cyclas gibba. *Alder*, *Cat*. 41.

Euglesa Henslowiana. *Leach*, *MSS*. *Brit*. *Mus*.

Pisidium pusillum. *Jenyns*, *Monog*. 14. t. 20. f. 4. 6.

Inhab. ponds.

* * *Shell inequilateral.*

118. 4. **Pisidium** *pulchellum*. Beautiful Pera. (t. 12. f. 151.) Shell oblique-ovate, ventricose, deeply striated; umbones rather blunt, simple.

Pisidium pulchellum. *Jenyns*, *Monog*. 18. t. 21. f. 1.

Cardium amnicum Jun. *Montag*. *T*. *B*. 88.

Var. 1. Smaller; shell thin, finely striated, umbones rather acute.

Pera pulchella. *Leach*, *MSS*. *Cab*. *Brit*. *Mus*.

Pisidium fontinale. *Pfeiffer*.

Cyclas fontinalis. *Brown*, *Edin*. *Journ*. *N*. *&* *G*. *Soc*. i. 11. t. 11. f. 5. 7.; *Alder*, *Cat*. 41.

Pisidium pulchellum β. *Jenyns*, *Mon*. l. c. t. 21. f. 2, 3.

Var. 2. Shell obliquely oval, finely striated, compressed, margin acute.

Pisidium pulchellum γ. *Jenyns*, *Mon*. 18.

Var. 3. Shell rather oblong, very ventricose, deeply striated; edge very blunt, hinge margin nearly straight.

Pisidium pulchellum δ. *Jenyns*, *Mon*. 18. t. 21. f. 4, 5.

Inhab. ponds, Birkham Common, Surrey.

Animal white; siphon variable, conical or elongate, with an entire or lobed end.

The siphonal tube assumes a variety of appearances even in the same individual, and it is very interesting to watch, under a low power of the microscope, the striking and rapid changes of form through which it passes in a short time.

Mr. Jenyns tells me that latter research has induced him to believe that vars. 1. and 3. are a distinct species, for which he would retain the name of *pulchellum*, while I would propose the name of *P. Jenynsii* for the other varieties.

119. 5. PISIDIUM *Henslowianum*. Appendaged Pera. (t. 1. f. 6.) Shell obliquely oval, ventricose, finely striated; umbones rather acute, with a laminar projection.

Pera Henslowiana. *Leach, MSS.*

Tellina Henslowiana. *Leach, MSS.*; *Shepp. Linn. Trans.* xiv. 150.

Pera appendiculata. *Leach, MSS. Brit. Mus.*

Cyclas appendiculata. *Turton, Man.* ed. 1. t. 15. f. 6.

Pisidium Henslowianum. *Jenyns, Mon.* 20. t. 21. f. 6, 7.

Inhab. rivers and ponds.

Animal white; siphon short, rather variable; generally rather conical and truncated.

This shell is easily known by the curious eave-like projections on the umbones, which are evidently formed on the edge of the very young specimen, and then gradually rise to the umbo as the shell increases in size by the addition of new laminæ of shelly matter to its edge.

120. 6. PISIDIUM *amnicum*. (t. 1. f. 5.) Shell ovate, ventricose, deeply sulcately striated; umbones rather blunt.

Tellina amnica. *Müller*, ii. 205.; *Linn. Trans.*

viii. 60.; *Dillwyn, D. Cat.* i. 105.; *Turt. Dict.* 168.

Tellina rivalis. *Maton, Linn. Trans.* ii. 44. t. 13. f. 37, 38.; *Don. B. Z.* t. 64. f. 2.

Cardium amnicum. *Montag. T. B.* 86.

Cyclas palustris. *Drap.* 131. t. 10. f. 15, 16.

——— obliqua. *Lam. Hist.* v. 559.; *Nilson,* 99.

Pisidium obliquum. *Pfeiffer,* 124. t. 5. f. 19, 20.

Cyclas amnica. *Turt. Biv.* 250. t. 11. f. 25., *Man.* ed. 1. 15. f. 5.; *Fleming, B. A.* 453.

Pisidium amnicum. *Jenyns, Mon.* 21. t. 21. f. 2.

Young shell rather compressed; umbones scarcely prominent.

Var. 1. Shell with very deep grooves.

Pera fluviatilis. *Leach, MSS. in Brit. Mus.*

Pisidium amnicum *β*. *Jenyns, Mon.* 22.

Var. 2. Shell nearly smooth, with slighter striæ.

Pera Henslowiana. *Leach, MSS. Brit. Mus.*

Pisidium amnicum *γ*. *Jenyns, Mon.* 22.

Inhab. rivers and gently running streams, residing wholly at the bottom, and being partly buried in the mud.

Animal white, siphon rather variable.

121. 7. Pisidium *cinereum.* Shell greyish or cinereous, rather compressed, oval, finely striated, and with two or three deep sulcations, forming darker zones across the shell; margin of the valves meeting at a rather acute angle; umbones obtuse, and not much produced, sometimes slightly capped, as in *C. calyculata.*

Pisidium cinereum. *Alder, Cat. Supp.* 4.

Var. More ventricose, and produced at the umbones.

Inhab. ponds, north of England.

Animal white; siphonal tube very short, broad, and flat, truncated at the end, and seldom protruded much beyond the edge of the shell.

This species may generally be readily distinguished from others of the genus by its more compressed and oval form, and its cinereous colour. It is the largest of the minute species. (*Alder.*)

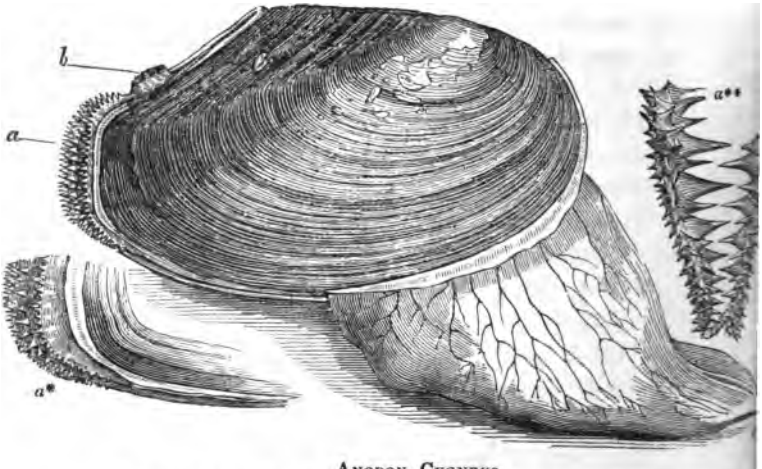
Length 2-10ths, height 7-40ths, thickness 5-40ths of an inch.

The genus Cyrena is now no longer found alive in this country, but it must have lived here at no very great period of time (geologically considered), for it is found abundant fossil at Grays, in company with a quantity of other fresh-water and land shells, all now found alive in the neighbourhood, as *Pisidium amnicum*, *Valvata obtusa*, &c. &c. (See *Introduction*, p. 40.)

Fam. 2. UNIONIDÆ.

Animal. Mantle lobes free all round except at the back, the hinder edge forming, when in conjunction, two holes, for the passage of the water, food, and rejectamenta, the upper (f. *b.*) small simple, the lower one (f. *a*, *a**, *a***) of which is bearded on the edge; foot (f. *c.*) compressed, ovate, subquadrate.

Shell oblong-elongate, equivalve inequilateral, solid, internally pearly, covered with a hard olive or black horny periostraca; hinge without any true cardinal teeth, with irregular anteriors, and long laminar posterior lateral teeth, or toothless; muscular scars numerous; ligament and cartilages external, elongate, strong.



Anodon Cygneus.
a, Lower siphon; *a**, *a***, magnified. *b*. Upper siphon. *c*. The foot.

These animals live sunk perpendicularly in the mud of rivers, with the front end downwards, and the siphonal edge even with the surface of the mud, but sinking themselves deeper when disturbed; they are also found under the shelter of stones in rivers and running water, with stony banks.

The family contains three genera, —

1. *Anodon.* Hinge toothless.
2. *Alasmodon.* Hinge with short anterior teeth.
3. *Unio.* Hinge with short anterior and long posterior teeth.

1. ANODON *Lam.* (Fresh-Water Muscle.)

Shell oblong, thin, rather compressed behind; hinge margin toothless.

122. 1. ANODON *cygneus.* Swan Fresh-Water Muscle. (t. 1. f. 8.) Shell oval, tumid, rounder and ventricose in front, compressed and more or less angular above behind, covered with an olive periostraca.

Mytilus cygneus. *Linn.; Montagu, T. B.* 170.

Anodonta cygnea. *Drap.; Lam.*

Anodon cygneus. *Turton, Biv., Man.* ed. 1. 17.

Young. The hinder slope more compressed and dilated.

Var. 1. cellensis. Shell large, ovate-oblong, very ventricose, thin, brittle, rather produced behind, upper and lower edge nearly parallel, straight.

Mytilus cellensis. *Schroet, Flussc.* t. 2. f. 1.

Anodonta sulcata. *Lam. Hist.* v. 85.; *Pfeiffer,* i. 110. t. 6. f. 1., ii. 6.; *Nilson,* 113.

Mytilus anatinus. *Linn. Trans.* viii. t. 3. *a.* f. 1. xiii. t. 5. f. 5.

Anodon cygneus. *Turton, Man.* ed. 1. f. 8.; *Drap. Moll.* i. 12. f. 1.?

Anodonta cellensis. *Rossm. Icon.* t. 19. f. 280.

? Anodon paludosus. *Turton, Biv.* 240. t. 15. f. 6.

Mytilus dentatus, *Turton, Dict.* is only an accidental distortion of this variety.

Inhab. ponds in very still water.

Var. 2. stagnalis. Very like last, but shorter, and the lower edge rather more rounded.

Mytilus stagnalis. *Sow. Brit. Miscel.* and *Brit. Mus.*

Inhab. ponds.

Var. 3. cygnea. Very like the two former, but shorter, and the lower edge still more rounded.

Anodonta cygnea. *Pfeiffer,* i. 3. t. 6. f. 4.; *Rossm. Icon.* t. 3. f. 67., t. 5. f. 342.

Mytilus cygneus. *Schroet. Flussc.* t. 1. f. 1.; *Penn. Brit. Zool.* iv. t. 67. f. 78.; *Linn. Trans.* viii. t. 3. *a.* f. 2., xiii. t. 5. f. 3.

Var. 4. piscinalis. Shell moderate, rather rhombic-oval, ventricose, rather thick, often beautifully coloured, rather produced behind, and with the wing more compressed and elevated.

Mytilus maculatus. *Linn. Trans.* xiii. t. 5. f. 6. (Young).

Anodonta piscinalis. *Nilson,* 116. n. 3.; *Schroet. Flussc.* t. 3. f. 1.?; *Drap.* t. 12. f. 2.; *Rossm. Icon.* t. 19. f. 281., t. 30. f. 416. (var.).

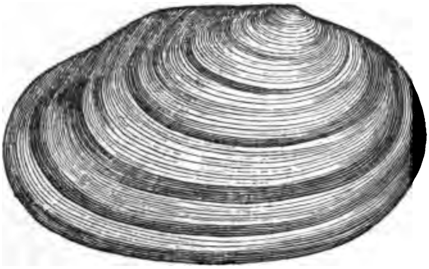
Anodonta ventricosa. *Pfeiffer,* ii. 30. t. 3. f. 1. 6.

Var. 5. rostrata. Shell moderate, oblong, rather rhombic, rather compressed, brownish, much produced behind, very short and rounded in front.

Anodonta rostrata. *Kokeil, MSS.*; *Rossm. Icon.* t. 20. f. 284.

Inhab. ponds, Liverpool. (*Brit. Mus.*)

Var. 6. complanata. Shell moderate, obovate, obliquely truncated behind, compressed, striated, brownish green and yellow zoned



Anodonta complanata. *Ziegl. MSS.*; *Rossm. Icon.* i. 112. t. 3. f. 68.; iv. 24. t. 20. f. 283.

Anodonta compressa. *Menke, Syn.* 106.

——— rhombea. *Schlüt.*

——— intermedia. *Lam. Hist.* vi. 86.; *Pfeiffer*, i. 113. t. 6. f. 3., ii. t. 5. f. 1. 6.; *Kenyon, Mag. N. Hist.* 1. f. 188.

Var. 7. avonensis. Shell moderate, ovate, rather rhombic, ventricose, thick, solid, rough, internally white, hinder slope subangular, behind rather truncated, covered with a calcareous or tufaceous deposit.

Anodonta ponderosa. *Pfeiffer*, ii. 31. t. 4. f. 1—6.; *Rossm. Icon.* iv. t. 20. f. 282.

Mytilus cygneus β. *Linn. Trans.* viii. t. 3. *a.* f. 3.

Mytilus incrassatus. *Shepp. Linn. Trans.* xiii. t. 5. f. 4.

Mytilus avonensis. *Linn. Trans.* viii. t. 3. *a.* f. 4.
Anodonta crassa. *Marks, MSS.*

Inhab. streams and ponds in calcareous countries.

Mr. Miller very justly remarks (*Ann. Phil.* iii. 377.), "I perfectly agree with Dr. Maton in considering *M. avonensis* only a variety of *M. anatinus.* Miss Bennett of Norton House favoured me lately with specimens from Tisbury, Wiltshire. They are old shells, and the animal having lived in water highly impregnated with chalk and calcareous matter, its epidermis has been secreted so rapidly, and increased the shell so much in thickness, that the Linnean character, '*testa fragilissima,*' is entirely lost."

Var. 8. Shell small, elliptical-ovate, brittle, rather produced behind, short and rounder in front.

Anodonta anatina. *Pfeiffer*, i. 112. t. 6. f. 2.; *Schroet. Flussc.* t. 1. f. 3.; *Rossm. Icon.* t. 30. f. 417—420.

Inhab. rivers, ponds, and ditches.

A most variable species, which appears to assume different appearances under every circumstance; as, for example, the depth, the stillness or motion, and the purity or impurity, or peculiar impregnation of the water in which it happens to be located.

Mr. Alder considers *A. cygnea, A. cellensis* Pfeiffer, *A. intermedia,* and *A. anatina* Lam., and *A. ventricosa* Pfeiffer, as distinct British species. (*Mag. Zool. & Bot.* ii. 118.)

Mr. Sheppard, after describing the four species, as he considers the varieties of this species to be, sums up as follows: — "To bring the specific differences above enumerated into one point of view; *M. anatinus* is distinguished from *M. cygneus* by its anterior (posterior) area running parallel with its base; again, from *M. macula* by the anterior area of the latter sloping upwards, and forming an angle with the fore part of the shell. In *M. cygneus* the base slopes upwards; and *M. incrassatus* differs from them all by its large exserted ligament, superior roughness of the outside, and in having the posterior part, in a slope from the umbones to the base, incrassated. (*Linn. Trans.* xiii. 87.)

2. ALASMODON *Say.* (Pearl Muscle.)

Shell oblong-elongate; hinge with short crested irregular anterior teeth in the right valve, shutting between two in the other valve; posterior lateral teeth small in the young, and wanting in the adult shells.

Found in rapid rivers.

This genus was established by Say: Dr. Leach named it *Damaris*, and Dr. Turton has retained for it the generic name of *Unio*; but, as this genus was before named by Say, and *Unio* is generally kept for the following genus, we are induced to adopt Say's name.

123. 1. ALASMODON *margaritiferus.* Pearly Alasmodon. (t. 2. f. 9.) Shell ovate-elongate, rather compressed, thick, heavy, black-brown, truncated below; cardinal teeth thick, conical.

Mya margaritifera. *Linn. Fauna Suec.* 516., *Syst. Nat.* ii., *List. Conch.* 149.; *Schroet. Flussc.* 168. t. 4. f. 1.

Unio margaritiferus. *Retz. Nov. Gen.* 16.; *Nilson*, 103. n. 1.; *Turton*, *Biv.* 242. t. 16. f. 1., *Man.* ed. 1. 19. f. 9.

Unio margaritifera. *Drap.* 132. t. 10. f. 17—19.; *Pfeiffer*, i. 116. t. 5. f. 11.

Unio sinuata. *Lam. H.* vi. 70.; *Pfeiffer*, ii. 33.; t. 7. f. 4.

Unio margaritifer. *Rossm. Icon.* i. 122. f. 72. 74., ii. 21. f. 129.

Unio elongatus. *Nilson*, 106. n. 2.

Unio elongata. *Mich. Compl.* 113. t. 16. f. 29.

—— Roissyi. *Mich. Compl.* 112. t. 16. f. 28.; *Proceed. Brit. Assoc. for* 1838.

Unio margaritifera, forma Roissyi. *Forbes; Malac. Mon.* 44.

Alasmodon margaritifer. *Fleming*, *B. A.* 417.

Young, with small posterior lateral teeth, like *Unio*.

Unio riparia. *Pfeiffer*, t. 5. f. 13.??

—— margaritifera. *Pfeiffer*, ii. t. 7. f. 1.

Var. kidney-shaped, lower edge elongate, bent in making a concave line.

Inhab. mountain rivers with a rocky bed.

The young specimens are oblong, without any contraction in the lower edge; and in some rivers, the shell appears to retain this appearance in its adult age; and it has hence been regarded as a species by Michaud and others, under the name of *U. Roissyi.* But in general, as they enlarge, they become much eroded about the umbones, and the lower margin is more or less drawn in. In this state, it is the *U. elongatus* of Lamarck. I do not know whether the erosion of the beak has any thing to do with the contraction of the lower edge, but all the oblong regular specimens I have seen have the periostraca of the beaks only slightly worn; while, on the contrary, all those that have the beaks much and extensively eroded belong to the other variety; and the extent of the inflection generally agrees with the state of the umbo. Figure 9. represents the intermediate state between the two varieties, and figure 10. much more resembles a younger specimen, both in form and colour, than any English *Unio* I have ever seen.

3. Unio *Retz.* (Union.)

Shell oblong-elongate; hinge with a short, crested, irregular, anterior, and an elongated, laminar, posterior, lateral tooth, in the right valve, shutting between two similar teeth in the other valve.

Lives in slow rivers and streams.

These shells are liable to distortion about the hinge; the margin becomes thinner and extended; the shell truncated in front, the lunule enlarged and irregular, and the teeth nearly obliterated. It gives a wedge-shaped appearance to the shell.

* *Anterior teeth compressed, elevated, sometimes crested.*

124. 1. Unio *pictorum.* Thin Painter's Union. (t. 2. f. 11.) Shell oval-oblong, ventricose, produced into a bluntly truncated beak behind, yellowish green, brownish zoned, greenish behind; upper edge nearly straight, lower rather retuse; hinge teeth very much compressed, arched, crenated; hinder teeth of left valve small or evanescent.

Young shell with a few isolated conical tubercles on the umbo. *Pfeiffer*, ii. t. 2. f. 24.

Mya pictorum. *Linn. S. Nat.?; Sturm, Fauna,* vi. 2. f. *a.*; *Wood, Conch.* 104. t. 19. f. 3, 4. *Schroet. Flussc.* t. 4. f. 6.

Unio pictorum. *Lam. Hist.* vi. 77.; *Ency. Meth.* t. 248. f. 4.; *Drap. Moll.* t. 11. f. 4.; *Rossm. Icon.* t. 3. f. 71. *a. b.; Pfeiffer*, i. t. 5. f. 9, 10.
Unio rostratus. *Pfeiffer*, i. 114. t. 5. f. 8.; *Alder, Mag. Nat. Hist.* ii.
Mysca pictorum. *Turton, Bivalves*, 245., *Man.* ed. 1. f. 11.
Unio elongatula. *Pfeiffer*, ii. 35. t. 8. f. 5, 6.
Inhab. slow rivers.

125. 2. Unio *Batavus*. Dutch Union. (t. 2. f. 10.)
Shell oblong, rounded at each end, with the beak rugged and warty.
Mya Batava. *Wood, Conch.* 403. t. 19. f. 1, 2.
Mysca Batava. *Turton, Man.* ed. 1. 20. f. 10. (cop. of *Wood*).
Mya pictorum. *Montagu, T. B.* 36.; *Donov. B. S.* t. 176.
Inhab. "the river Kennet above Newbury."

Shell an inch long and two broad, greenish brown, without contraction in the frout margin, by which it is chiefly distinguished from *Unio pictorum;* inside dark bluish. I only know this shell from Dr. Turton's account. It appears by Wood's figure to have been described from a worn shell, such as the Dutch colours are sent in. I do not find any species like it figured in any of the works on European shells. It is, perhaps, a specimen of the former with the edges filed. The figure is more like a young *Alasmodon* in shape and colour; and this is the only *Unionida* I know which is dark blue within. Mr. James D. C. Sowerby informs me my suspicions are correct, and that Wood's figure was taken from a Dutch specimen, so that it is most probable this species is not British.

* * *Anterior teeth conical, high.*

126. 3. Unio *tumidus.* Tumid Union. (t. 2. f. 13.) Shell ovate-elongate, wedge-shaped, tumid, produced and attenuated behind, thick, brown; lower edge curved; umbones prominent, rugose; anterior teeth thick, high, triangular, strong; left hinder strong.

Unio tumidus. *Retzius, Nov. Gen.* 17. n. 3.

—— tumida. *Pfeiffer,* ii. 34. t. 7. f. 2, 3., & t. 8. f. 1, 2.; *Rossm. Icon.* i. 117. t. 3. f. 70. *a. b.*, ii. 27. & t. 14. f. 202, 203, 204.

Mysca solida. *Turton, Bivalves,* 246. t. 16. f. 2., *Man.* ed. 1. 22. f. 13.

Mya ovata. *Donovan,* iv. t. 122.

Young shell with irregular, concentric, nodulose ridges round the umbones. *Pfeiffer,* ii. t. 2. f. 25.

Inhab. slow rivers. New River, near London, West India docks.

Known from *Unio pictorum* by being much more solid, having larger and stronger anterior teeth, and by its tapering behind.

Mrs. Corrie has very kindly sent me some specimens with pale salmon-coloured pearly insides, which were found in a pond in Warwickshire.

127. 4. Unio *ovalis.* Oval Union. (t. 2. f. 12. ?) Shell elliptical-ovate, thick, yellowish green rayed, tapering behind; hinder margin slightly arched, or contracted; umbones prominent, wrinkled, often worn; cardinal teeth thick, conical, crenated.

Mya ovalis. *Montag. T. B.* 563.; *Donov. B. S.* t. 89.

Mya ovata. *Wood, Conch.* 105. t. 19. f. 5.

—— depressa. *Don. B. S.* iii. t. 101.

Mysca ovata. *Turt. Biv.* 246., *Man.* ed. 1. 21. f. 12.

Unio Batava. *Lam. Hist.* vi. 78.; *Pfeiffer,* i. t. 5. f. 14.

Young shell elliptical-ovate. *Pfeiffer,* ii. t. 2. f. 23.

Inhab. slow rivers.

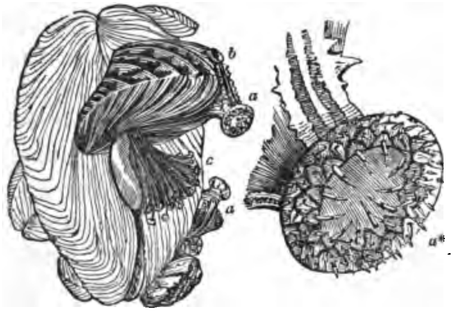
This shell, of which I have not seen a specimen, appears to differ in being shorter and higher than *Unio tumidus.* If it is the same as Pfeiffer's, it retains the same character in its very young state. But Dr. Turton's figure is probably copied from Wood's; and I am not certain that his figure was not taken from a slightly distorted *U. tumidus* with an irregular hinge. It is a very doubtful British species.

Mr. James D. C. Sowerby has sent me a specimen which he considered at the time that he made the figures for the first edition, to be like Dr. Turton's species; it is only a distorted specimen of *U. tumidus,* with the lunule much and irregularly enlarged, and the anterior teeth much distorted. Mr. Alder considers *U. tumidus* (*Mysca solida* and *M. ovata* Turt.), *U. pictorum, U. rostrata* Lam, and *U. Batavus* Lam., as distinct British species. (*Mag. Zool. & Bot.* ii. 118.) I have never been able to distinguish more than two, *U. pictorum* and *U. tumidus.*

Fam. 3. DREISSENADÆ.

Shell regular, equivalve, inequilateral; beaks terminal, furnished with a septum; muscular scars three, the central one simple and linear, hinge toothless.

Animal; — mantle entirely close all round, except three apertures; one below for the passage of the foot, and two behind; the upper one a roundish hole, the lower one produced into a conic siphon with a large reflexed mouth, which is broader within; anterior extremity of the body bifurcate, and included between the segments of the anterior transverse muscle, which is attached to the front septum of the shell; the abdomen depressed foot elongate-conical, with a tuft of byssus at the base, and a distinct byssal groove; the extremities of the gills free throughout their hinder half.



A group of DREISSENA POLYMORPHA, *on an old shell.*
a, The lower siphon; *a**, magnified: *b*, upper siphon; *c*, the byssus.

This genus perhaps bears the same relation to

Mytilus as the *Iridinæ* do to the *Uniones*, as they both differ from their apparently allied genera by the adhesion of the lobes of the mantle, and the possession of a siphon; but in our present imperfect state of knowledge of the animals of the *Conchifera*, and of the value of the adhesion or the separation of these parts in a systematic point of view, perhaps it is better to regard them as the type of a distinct family.

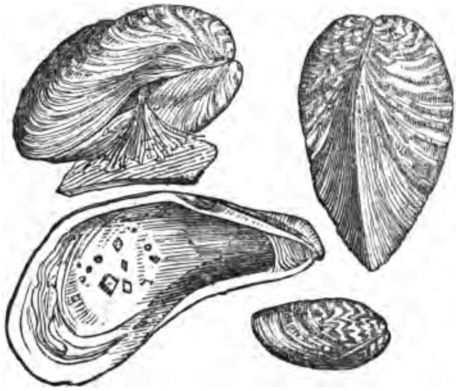
The fossil genus *Congeria* agrees with *Dreissena* in many particulars, and perhaps belongs to the same family, if it is in reality a separate genus.

1. DREISSENA *Van Beneden.* (Dreissena.)

The animal of this genus differs from *Mytilus* in the mantle being closed, while in the latter it is open. In the latter, the retracting muscles are divided into several bundles, each of which has its proper attachment to the shell, while in *Dreissena* these muscular cords are united into a single bundle, which has only one point of attachment. In *Mytilus*, the branches adhere through their whole length; in *Dreissena*, the extremities are free, and float upon the posterior transverse muscle.

This genus was first established by Mr. Van Beneden. It has also been named *Tichogonia* by Rossmäsler in 1835. He did not know the animal, although it had been described eleven years before by Mr. Sowerby.

128. 1. DREISSENA *polymorpha.* Zebra Dreissena.
Shell triangular, keeled, olive, varied with black, wavy-lined.



Mytilus Volgæ. *Chemn.* xi. 205. f. 2028.
——— polymorphus. *Pallas, Voy. Russ. App.* 211.; *Sow. Gen. Shell.* f. 4.
Mytilus Chemnitzii. *Férussac.*
——— lineatus. *Waardenburg, Mol. Belgi.*
——— arca. *Kickx, Monag.*
——— ? Volgensis. *Gray, Ann. Phil.* 1825.
——— Hagenii. *Baer, Fér. Bull. Sci. Nat.* 1826, 140.
Mytilus Toreyi. *Stenz.*
Tichogonia Chemnitzii. *Rossm. Icon.* i. 1113. t. 3. f. 69.
Dreissena polymorpha. *Van Beneden, Ann. Sci. Nat.* 1835, 210. t. 8. f. 1—11.; *Strickland, Mag. Nat. Hist.* 1838, 361.

Inhab. lakes and rivers, attached to stones, timber, and other shells.

Mr. James de Carle Sowerby first brought the fact of this animal having been introduced before the public on Nov. 2nd, 1824, when he presented some specimens to the Linnean Society, stating them to be "probably the *Mytilus polymorphus* Gmelin, 3363, which is found in abundance, attached to shells and timber, in the Commercial Docks, by James Bryant, Esq., who uses the animal as bait for perch." Mr. Sowerby observes, that "the strong resemblance which it bears to the marine *Mytili* is very remarkable. Independently, however, of the *septa* within the valves, there are many other differences to be observed, several of which are in the structure of the included animal, although it possesses a strong byssus; among others, the foot is small and the lips of the mouth are differently placed, being more like those in the animal of the *Unio ovalis.* It has two tubes, and the mantle is united almost all round, and bordered with a bright orange between two bands of black. Some of the *septa* within the beaks appear to be a kind of disease, as they are not constant."

"The same species is found in the Danube and in the rivers of Russia; but the British species are much larger and finer than any foreign one I have seen." (*Linn. Trans.* xiv. 585.)

In 1825, in a List of Shells not taken notice of by Lamarck (*Ann. Phil.* 1825), I stated that this shell would "perhaps form a genus distinct from *Mytilus*, and peculiar for its fresh-water habitation," and added that, "like Mollusca of that station, the animal can live for a long time out of water. I have kept one for three weeks, when it was still healthy. It is found in the Commercial Docks, where it most likely has been introduced with timber from the Volga."

I am now confirmed in the idea that this is the way in which they were introduced, as a friend has informed me that he has seen them sticking to the logs of Baltic timber before they were unloaded from the ship. (See *Wiegmann*, *Arch.* 1838.) In the dock they attach themselves to stones, *Uniones*, *Anodons*, and the walls of the docks, as well as to the logs.

This species illustrates how rapidly molluscous animals may become naturalised, and spread over a great extent of country; for Mr. J. de C. Sowerby, in 1825 (*Zool. Journ.* i. 584.), first recorded it as naturalised in the Commercial Docks, where he observed that it had probably been brought with the timber: it has since been widely extending itself, and is now to be found in most of the docks communicating with the Thames. In 1834, Mr. Stark communicated to the Wernerian Society the discovery of this species in the Union Canal, near Edinburgh; and in 1836, the Rev. M. J. Berkeley, the eminent cryptogamic botanist, discovered it, with Mr. J. Streatfield, on the piers of the bridge which crosses the Nen at Fotheringay; and again a little higher up the same river, on stones of a small overfall at Tansor: he believes they were introduced from Wisbeach on timber since 1828.

It has been naturalised into Holland and on the Rhine. It is also found with tertiary fossils in Transylvania, Moravia, and near Vienna.

Mr. Lyell (*Geol.*), not being aware that these animals had the power of living a long time out of water, and that they were most probably brought in the holds of ships with the Baltic timber, and thus introduced into our docks, where the timber is unloaded, believes that the animals were introduced attached to the bottom of Baltic ships, and thus obliged to pass through the sea, before being again brought to their natural station in fresh water. And Mr. Garner, in his curious but rather crude paper on the anatomy of Lamellibranchiata (*Mag. Nat. Hist.* n. s. iii. 303.), ventures to explain this theory by supposing that the animals "kept their valves constantly closed" during the voyage through the sea to the fresh water!

"O LORD, how manifold are thy Works! in Wisdom hast thou made them all: The Earth is full of thy riches."— PSALM civ. 24.

APPENDIX.

SINCE the greater part of this work has been printed, M. Bouchard Chantreux has sent me his "*Catalogue des Mollusques Terrestres et Fluviatiles du Pas de Calais,*" which contains some interesting details on the habits and manners, and especially on the reproduction of these animals. Many of the facts recorded in this work must have been observed by most collectors of European shells; but they have been left for M. Bouchard to publish. From this work I shall make the following abstract:—

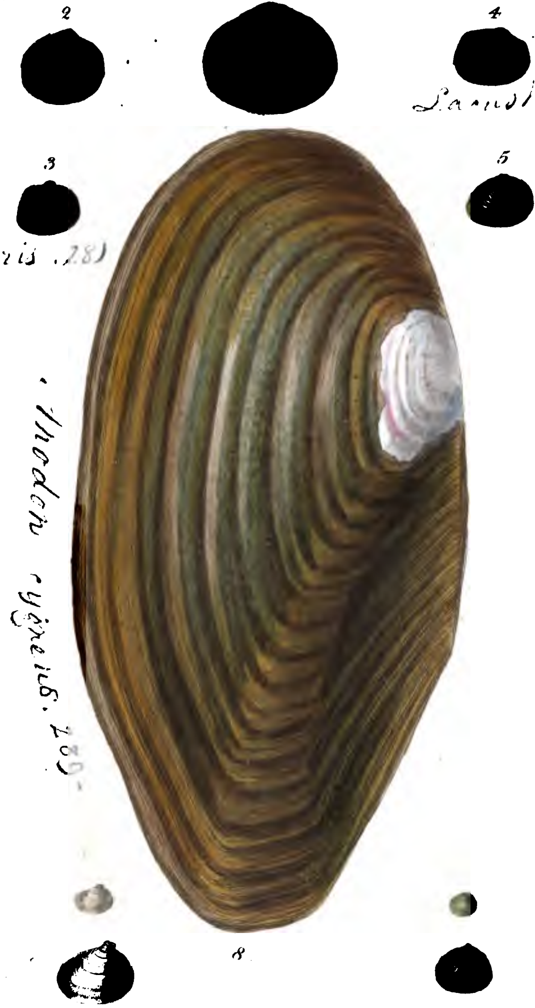
He observes that the *Arions* and *Limaces* are semi-nocturnal animals; the eggs of *Arions* are separate, and covered with a hard calcareous coat, while those of the slugs (*Limaces*) are covered with a transparent coat, and often united together by a membrane like a string of beads.

The land soles (*Arion*) lay about 70 to 100 eggs between May and September. They vary from 26 to 40 days in hatching, and the animals attain their full growth in a year; but they begin to deposit their eggs a month or two before that period. The young of *A. ater* is dull brown, with yellowish sides. The eggs of *A. hortensis* are very phosphorescent for the first 15 days after they are laid. M. Bouchard says that the true *A. hortensis* has no shell; he therefore doubts the species described by MM. Brard, Grateloup, Michaud, and Millet, which is said to produce *Limacella concava;* and I find that, by an oversight, I have referred this *Limacella* both to *Arion hortensis* and *Limax flavus.*

The eggs of the slugs (*Limaces*) are laid between May and September. They are hatched in about 25 or 30 days, and the young reach their full size near the end of the year. *Limax cinereus* lays about 50 or 60, and *Limax agrestis* is much more prolific, as it continues laying the number of eggs in each mass; the third, the number of days after they are laid before they hatch.

	1.	2.	3.
Limnea auricularia	elliptical	60—100	15—16
——— ovata		60— 80	
——— peregra		60— 80	
——— stagnalis		100—130	
——— palustris	cylindrical	60— 80	
——— fossaria	rounded	15— 20	
Amphipeplea glutinosa		30— 40	
Physa hypnorum	round or oval	3— 12	16
——— fontinalis	roundish	3— 12	16
Velletia lacustris	orbicular	5— 12	24—26
Planorbis contortus		6— 8	10—12
——— corneus		20— 40	16
——— albus		10— 13	12
——— imbricatus		3— 6	10—12
——— vortex		12	10—12
——— marginatus		6	
——— carinatus		6	
——— nitidus		4— 8	10–12

Cyclas. Pl. I.



Rivicola 279

Cornea. 280.

Lacustris. 17.

Lacustris .281

Pisidium amnicum 285.

Anodon cygneus. 289.

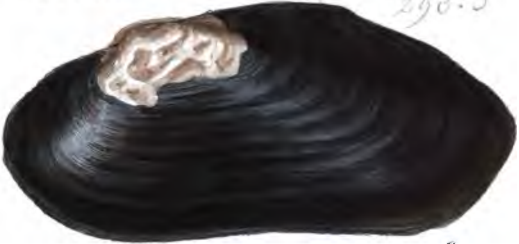
P. Henslowianum 285

P. [illegible] 2[illegible]

Pub^d by Mess^{rs} Longman & C^o Jan^y 1840

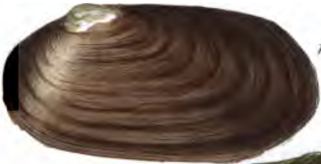
Pl. II.

Alasmodon margaritiferus 298.



9

U. Batavus 296.



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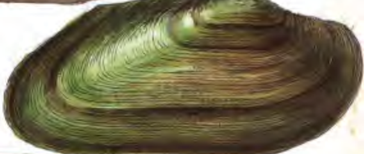
U. pictorum 295.



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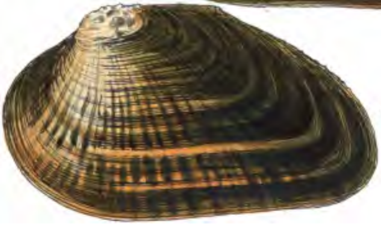

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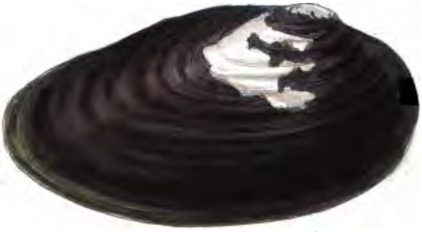
U. ovalis 297.



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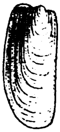
U. tumidus 297.

Pub.d by Mess.rs Longman & C.o Jan.y 1840.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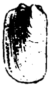
76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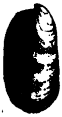
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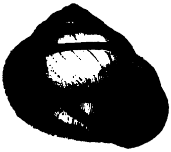
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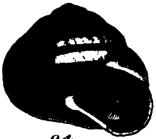
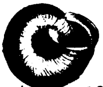
H. nemoralis 132

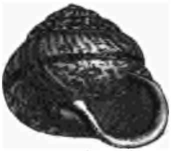
19

20


24
Hortensis p. 13[illegible]

21
Vitrina pellucida


28*
H. rufescens
var. albida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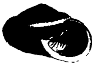
H. arbustorum 137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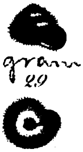
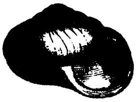
H. rufescens p. 156


H. granulata
29 151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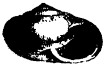
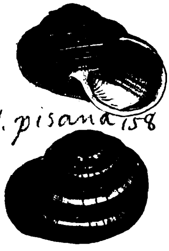
H. cantiana 144


27
H. carthusiana p. 146

Pub.d by Mess.rs Longman & C.o Jan.y 1840.



H. pisana 158

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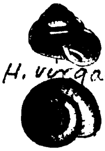

H. virgata 160

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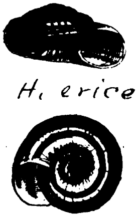

H. ericetorum 163

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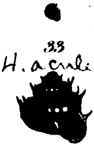

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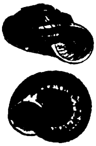
H. aculeatus



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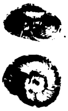
H. caperata 162



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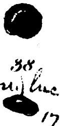
H. fusca 147



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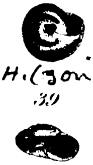
H. (zon.) lucidus 174



H. (zonites) alliarius 168

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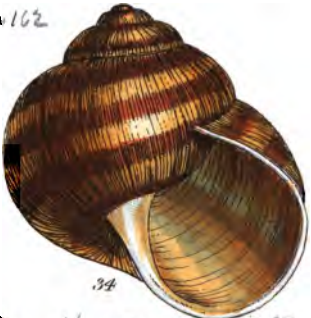

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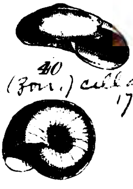
H. pomatia 135



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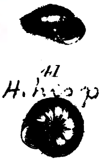
H. (zon.) cellaria 170



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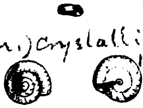
H. hispida 154



H. (zon.) crystallinus 176

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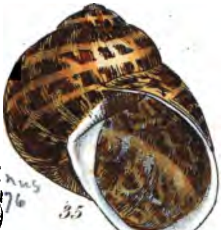

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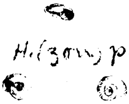
H. aspera 128



H. (zon.) purus 171

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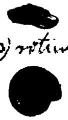
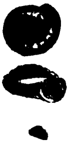
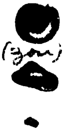
Pl. V.

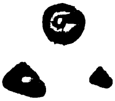

H. (zonites) rotundatus
165

44


H. zon. umbilicatus
45 166


H. (zon.) pygmaeus
167

46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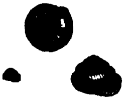
H. fulva 148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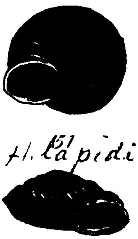
H. lamellata 150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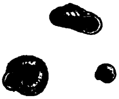
H. lapidica 140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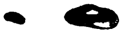
H. (zon.) [illegible] ?
175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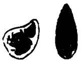
H. (zonites) radiatulus ?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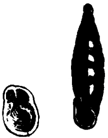
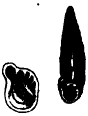
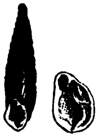
Azeca tridens
139


53
Clausilia [illegible]idens


54
C. Rolphii
15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Clausilia biplicata
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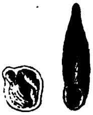
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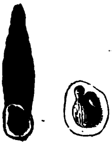
C. papillaris
14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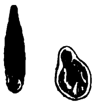
C. labiata
14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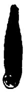
21


59
C. [illegible]
2[illegible]

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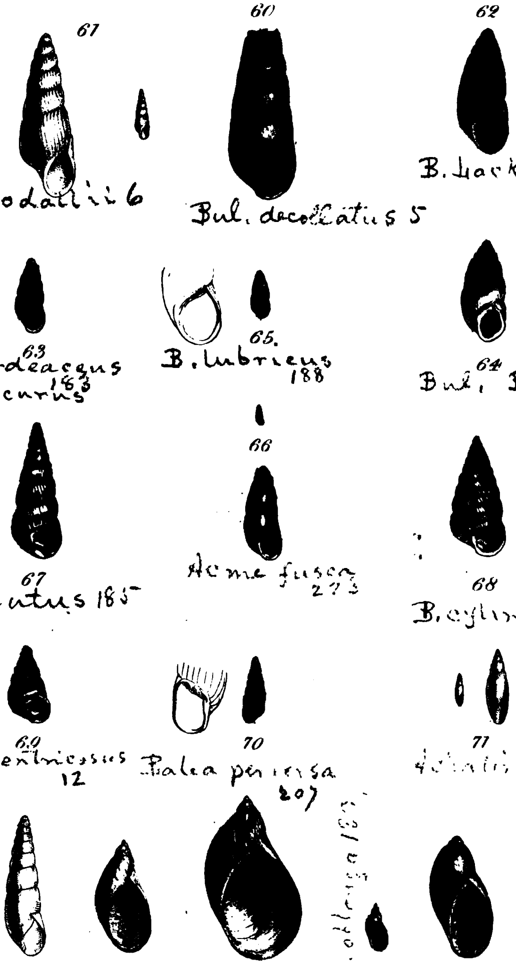


B. Goodallii 6

Bul. decollatus 5

B. Hockamensis 181

B. hordeacens obscurus 183

B. lubricus 188

Bul. Pupa 13

Acme fusca 273

B. acutus 185

B. cylindricus 20

Bul. ventricosus 12

Balea perversa 207

[illegible] 171

Ach. octona 18

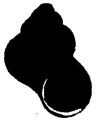
[illegible]

[illegible] 178

[illegible] oblonga 183

Pub.d by Mess.rs Longman & C.o Jan.y 1840.

Pl. VII.



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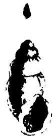
Cyclostoma elegans
275



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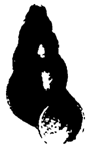
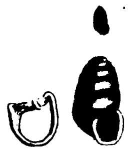


76

Cyclos. ferrugineum
163



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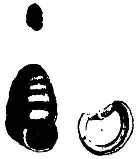
P. umbilicata
193



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P. marginata
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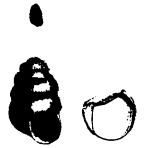

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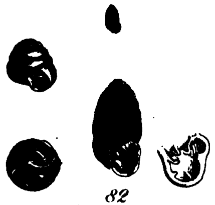

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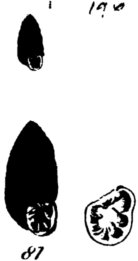
P. anglica 195



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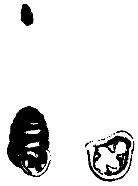
P. juniperi [illegible]
[illegible] 197



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V[illegible]
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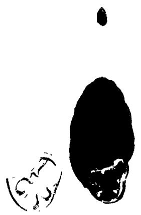
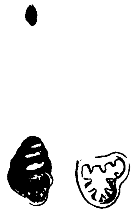


84

Vertigo [illegible]
202



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[illegible] pusilla
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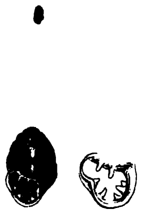

86

Vertigo [illegible]

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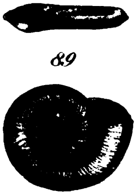
Pl. VIII.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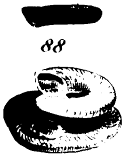
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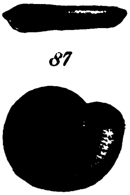
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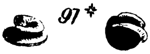
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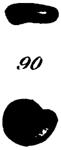
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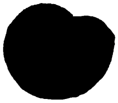
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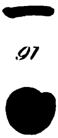
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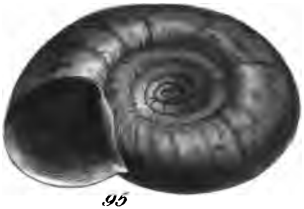
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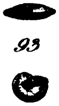
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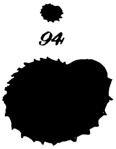
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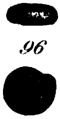
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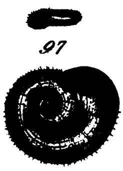
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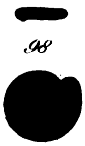
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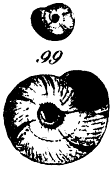
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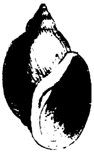
334 ?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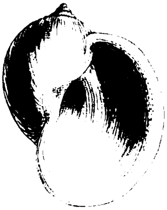
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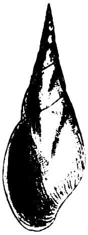
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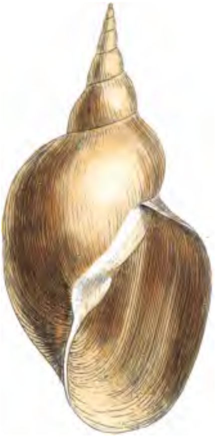
104

107

102

108

106

113

110

109

111

112

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Pl. X.

115

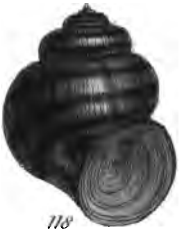
114

V. piscinalis 97

116

117

Valv. minuta 17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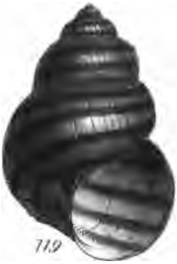
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120

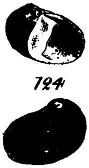
128

128

127

122

123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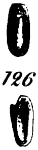
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125

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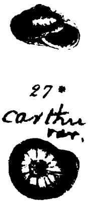
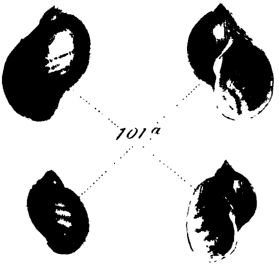


27*

H. carthusiana var. 146



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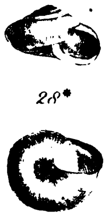

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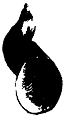
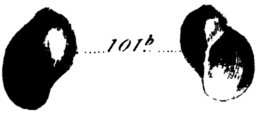
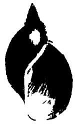
101.^c

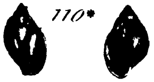




101^b

101^d





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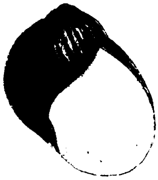

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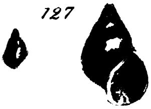
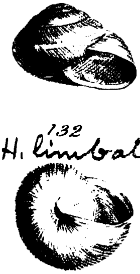
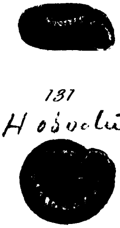




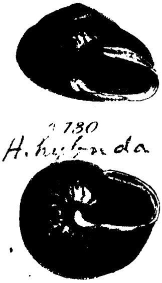
132

H. limbata 143



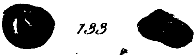
131

H obvoluta? 139



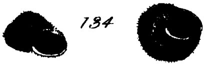
? 130

H. hybrida 132



133

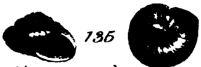
H. revelata 152



134

H. sericea 153

Pub^d by Mess^rs Longman & C^o Jan^y 1840.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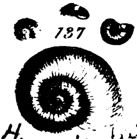
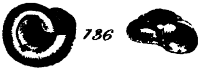
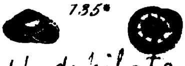
H. concinna 154


137

H. radiatulus 173


136

H. (Zonites) nitidulus 172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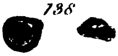
H. depilata 158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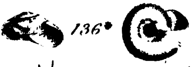
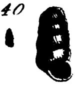
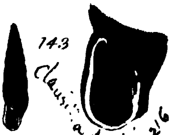

136*

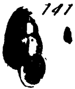
H. (Zon.) nitidulus var. [illegible] 173


140

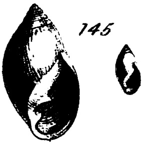
Vertigo cylindrica 200


143

Clausilia dubia 226


141

Vertigo alpestris 202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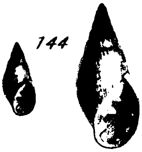
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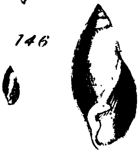
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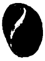
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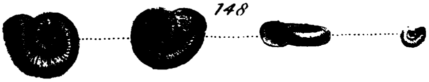
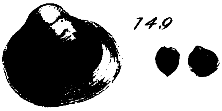
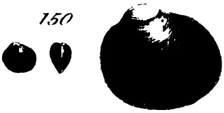
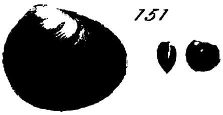
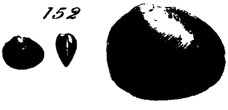

148


149


150


151


152

EXPLANATION OF THE PLATES.

(*The species in italic are foreign.*)

Table I.

1. Cyclas rivicola, p. 279.
2. cornea, 280.
3. lacustris, 281.
4. *lacustris*, Drap. cop., see p. 17.
5. Pisidium amnicum, 285.
6. Henslowianum, 285.
7. pusillum, 283.
8. Anodon cygneus, 289.

Table II.

9. Alasmodon margaritiferus, 293.
10. Unio *Batavus*, 296.
11. pictorum, 295.
12. ovalis, 297.
13. tumidus, 297.

Table III.

14. Limax maximus, 112.
15. carinatus, 115.
16. flavus, 114.
17. agrestis, 117.
18. *Testacellus Maugei*, 5.
19. *haliotoideus*, var. scutulum, 124.
20. *Testacellus haliotoideus*, 124.
21. Vitrina pellucida, 120.
22. Helix rufescens, 156.
23. nemoralis, 132.
24. hortensis, 130.
25. arbustorum, 137.
26. Cantiana, 144.
27. Carthusiana, 146.

27.* *See* Tab. XI.

28. rufescens, 156.

28.* *See* Tab. XI.

29. granulata, 151.

Table IV.

30. Helix Pisana, 158.
31. virgata, 160.
32. caperata, 162.
33. aculeata, 149.
34. Pomatia, 135.
35. aspersa, 128.
36. fusca, 147.
37. ericetorum, 163.
38. Zonites lucidus, 174.
39. alliarius, 168.
40. cellarius, 170.
41. Helix hispida, 154.
42. Zonites crystallinus, 176.
43. purus, 171.

Table V.

44. Zonites rotundatus, 165.
45. umbilicatus, 166.
46. pygmæus, 167.
47. Helix fulva, 148.
48. lamellata, 150.
49. pulchella, 141.
50. *Helicophanta brevipes*, 9., copied from Drap.
51. Helix lapicida, 140.
52. Azeca tridens, and mouth magnified, 189.
53. Clausilia bidens, and mouth magnified, 212.
54. Clausilia Rolphii, and mouth magnified, 215.
55. Clausilia biplicata, and mouth magnified, 214.
56. *Clausilia papillaris*, and mouth magnified, 14.
57. *Clausilia labiata*, and mouth magnified, 14.
58. Clausilia nigricans, and mouth magnified, 217.

59. Clausilia nigricans, var. dubia, 217.

Table VI.

60. *Bulimus decollatus*, 5.
61. *Goodallii*, and magnified, 6.
62. Bulimus Lackamensis, 181.
63. hordeaceus, 183.
64. *Pupa*, 13.
65. Zua lubrica, and mouth magnified, 188.
66. Acme fusca, and magnfied, 223.
67. Bulimus acutus, 185.
68. *cylindrus*, 20.
69. *ventricosus* cop. of Drap. 12.
70. Balea perversa, and mouth magnified, 207.
71. Achatina acicula, and magnified, 191.
72. *Achatina octona*, 18.
73. Succinea putris, 178.
74. Pfeifferi, 179.
74.* var., 179.
139. oblonga, 180.

Table VII.

75. Cyclostoma elegans, 275.
76. *ferrugineum*, 16.
77. Carychium minimum, and magnified, 221.
78. Pupa umbilicata, shell and its mouth magnified, 193.
79. Pupa marginata, shell and its mouth magnified, 196.
80. Vertigo edentula, shell and its mouth magnified, 199.
81. Pupa juniperi, shell and its mouth magnified, 197.
82. Pupa anglica, old and young shells and their mouths magnified, 195.
83. Vertigo pygmæa, shell and its mouth magnified, 201.
84. Vertigo substriata, shell and its mouth magnified, 202.
85. Vertigo palustris, shell and its mouth magnified, 204.
86. Vertigo pusilla, shell and its mouth magnified, 205.

Table VIII.

87. Planorbis marginatus, 265.
88. var., 265.
89. carinatus, 262.
90. marginatus jun., 265.
91. vortex, 267.
91.* distorted and magnified, 267.
92. Planorbis carinatus, var. 1., 263.
93. Planorbis nitidus, 268.
94. imbricatus, 261.
95. corneus, 258.
96. contortus, 270.
97. albus, 259.
98. spirorbis, 268.
99. Segmentina lineata, 271.

Table IX.

100. Limnæus auricularius, 232.
101. pereger, 233.
101.* *See* Tab. XI.
102. *scaturiginum*, copied from Drap., 15.
103. Amphipeplea glutinosa, 243.
104. Limnæus stagnalis, 237.
105. var. 1., 237.
106. glaber, 242.
107. palustris, 239.
108. truncatulus, 240.
109. *Bulimus exilis*, 18.
110. Physa fontinalis, 251.
110.* *See* Tab. XI.
111. *Diastropha contorta*, 16.
112. *Aplexus rivalis*, 21.
113. hypnorum, 255.

TABLE X.

114. Valvata piscinalis, 97.
115. cristata, 98.
116. var., 17.
117. *minuta*, 17.
118. Paludina vivipara, and operculum, 90.
119. Paludina achatina, 91.
120. Bithinia tentaculata, and operculum, 93.
121. "Paludina similis," 94.
122. " viridis," 95.
123. " stagnorum," 95.
124. Neritina fluviatilis, 83.
125. Ancylus fluviatilis, 249.
126. Velletia lacustris, 250.
127. *See* Tab. XI.
128. Bithinia ventricosa, 94.

TABLE XI.

27.* Helix Carthusiana, var. thin, 146.
28.* Helix rufescens, var. albida, 157.
101. *a*. Limnæus pereger, var. lineatus, and reversed var. 234.
101. *b*. Limnæus pereger, var. lacustris, 234.
101. *c*. Limnæus pereger distorted,
101. *d*. Limnæus pereger, var. acutus, 234.
110.* Physa fontinalis, var., 251.
127. Assiminia Grayana, and magnified, 86.
128. *See* Tab. X.
129. Helix aperta, with epiphragma, 127.
130. Helix hybrida, 132.
131. obvoluta, 139.
132. limbata, 143.
133. revelata, 152.
134. sericea, 153.

TABLE XII.

135. Helix concinna, 154.
135.* depilata, 155.
136. Zonites nitidulus, 172.
136.* Var. Helmii, 173.
137. radiatulus, 173.
138. excavatus, 175.
139. *See* Plate VI.
140. Vertigo cylindrica, 200.
141. alpestris, 202.
142. (Not to be procured.)
143. Clausilia dubia, and mouth magnified, 216.
144. Conovulus denticulatus, 225.
145. Conovulus bidens, 227.
146. albus, 227.
147. Amphipeplea involuta, 245.
148. Planorbis lævis, 261.
149. Pisidium obtusale, 282.
150. nitidum, 283.
151. pulchellum, 284.
152. cinereum, 286.

INDEX.

Abida, 197.
—— secale, 197.
Acarus Limacum, 114.
Achatina, 67. 110. 190.
—— acicula, 26. 45. 49. 187. 191.
—— bicarinata, 8.
—— clavulus, 6.
—— folliculus, 15.
—— lubrica, 188.
—— octona, 18. 195.
Acicula, 191.
Acme, 67. 221, 222, 223.
—— fusca, 38. 49. 219. 223.
—— lineata, 223.
Acteon, 226.
—— denticulata, 225.
Alæa cylindrica, 201.
—— marginata, 196.
—— nitida, 199.
—— palustris, 204.
—— revoluta, 200.
—— substriata, 203.
—— vulgaris, 202.
Alasmodon, 69. 289. 293. 295.
—— elongatus, 38. 48. 53.
—— margaritifer, 294.
—— margaritiferus, 293.
—— Roissyi, 38. 53.
Amphipeplea, 67, 230, 231. 243. 246.
—— glutinosa, 25. 39. 243, 244.
—— involuta, 23. 38. 50. 53. 245.
Amplexus, 143.
—— crenellus, 142.
—— paludosus, 142.
Ampullariadæ, 57. 89.
Ancylina, 247.
Ancylus, 54. 66. 70. 230. 247. 249, 250.
Ancylus elegans, 42.
—— fluviatilis, 41. 48. 219. 249.
—— lacustris, 250.
—— sinuosus, 249.
Anodon, 69. 289.
—— cygneus, 26. 41. 46. 288, 289, 290. 292.
Anodonta anatina, 292.
—— avonensis, 291, 292.
—— cellensis, 289, 290. 292.
—— complanata, 291.
—— compressa, 291.
—— crassa, 292.
—— intermedia, 292. 296.
—— paludosa, 290.
—— piscinalis, 290.
—— ponderosa, 291.
—— rhombea, 291.
—— rostrata, 291.
—— sulcata, 289.
—— ventricosa, 290. 292.
Anomia, 73.
Ansulus, Ansylus, 247.
Aplexus, 67. 143. 181. 224. 230, 231. 255.
—— hypnorum, 48. 255.
—— rivalis, 21.
Arianta, 137.
—— arbustorum, 138.
Arion, 104. 111.
—— antiquorum, 45.
—— ater, 47. 103, 104. 106. 108. 112.
—— circumscriptus, 107, 108.
—— empiricorum, 105.
—— hortensis, 51. 106, 107.
—— subflavus, 105.
Arionidæ, 101. 103, 104. *164*.
Ascidia, 73.
Assiminia, 85.

Assiminia Grayana, 23. 33. 51. 54. 67. 78. 86, 87. 243.
Auricula alba, 228.
—— bidentata, 227.
—— bullæoides, 20.
—— Carychium, 221.
—— coniformis, 20.
—— erosa, 227.
—— lineata, 223.
—— minima, 221.
—— multivolvis, 20.
—— myosotis, 225, 226.
—— nitens, 21.
—— ovula, 21.
—— personata, 225.
—— pusilla, 21.
Auriculæ, 21.
Auriculidæ, 56. 82. 101. 219. 274.
Azeca, 68. 110. 187 189.
—— Goodallii, 189, 190.
—— Matoni, 190.
—— tridens, 38. 49. 189.

Balea, 110. 207.
—— fragilis, 207.
—— perversa, 47. 68. 207.
Bithinia, 67. 74. 90.
—— impura, 26. 33. 47,
—— tentaculata, 41. 78. 92, 93.
—— ventricosa, 33. 51. 87. 94. 95.
Books, list of, 53.
Brachiopodes, 73.
Buccinum Acicula, 191.
—— auricula, 233.
—— glabrum, 242.
—— glutinosum, 244.
—— leucozonias, 12.
—— palustre, 239.
—— peregrum, 233.
—— roseo-labiatum, 237.
—— terrestre, 191.
—— truncatulum, 241.
—— zebra, 7.
Bulimus, 19. 67, 68. 110. 125, 126. 181. 187. 189, 190, 191, 192. 207. 211. 223. 255.
—— Acicula, 191.
—— acutus, 12. 18. 24. 27. 36.. 45. 47. 185, 186, 187.
—— antiguensis, 18.
Bulimus articulatus, 20. 185. 187.
—— aureus, 212.
—— auricularius, 233.
—— bicarinatus, 8.
—— bidens, 213.
—— castellatus, 42.
—— clavulinus, 6.
—— clavulus, 6. 184.
—— coniformis, 20.
—— cylindrus, 20.
—— decollatus, 5. 27. 52. 184. 195.
—— detritus, 12. 186.
—— ellipticus, 42.
—— exilis, 12. 18.
—— fasciatus, 20 185.
—— fontinalis, 251.
—— fragilis, 19.
—— fuscus, 19.
—— Goodallii, 6.
—— guadalupensis, 18.
—— hæmastoma, 7.
—— hordeaceus, 183.
—— Lackamensis, 38. 50. 181.
—— leucostoma, 242.
—— limosus, 234.
—— lineatus, 223.
—— lubricus, 188, 189.
—— Montacutus, 182.
—— montanus, 182.
—— muscorum, 194.
—— oblongus, 7.
—— obscurus, 45. 49. 182, 183. 198. 241.
—— octonus, 18.
—— ovulus, 21.
—— papillaris, 14.
—— perda, 251.
—— pereger, 233.
—— perversus, 216, 217.
—— pupa, 13. 16. 184.
—— radiatus, 12. 19.
—— rosaceus, 7.
—— secale, 209.
—— sepium, 12.
—— similis, 13.
—— stagnalis, 237.
—— succineus, 178.
—— tentaculatus, 93.
—— tridens, 13.
—— trifasciatus, 18.
—— truncatus, 241.

Bulimus tuberculatus, 13. 62. 184.
—— undulatus, 7.
—— variabilis, 185.
—— ventricosus, 12. 185, 186, 187.
—— zebra, 7.
—— zigzag, 7.
Bulin, 181. 255.
Bulla akera, 246.
—— bicarinata, 8.
—— fluviatilis, 251, 252, 253.
—— fontinalis, 251. 253.
—— hypnorum, 255.
—— zebra, 7.
Bullæ, 229. 244.

Cardium, 84.
—— amnicum, 284. 286.
—— corneum, 279, 280.
—— edule, 95.
—— lacustre, 281.
—— nux, 280.
Carocolla albella, 9.
—— bicolor, 195.
—— elegans, 9.
—— lapicida, 140.
Carocollæ, 195.
Carychiadæ, 274.
Carychia, 220.
Carychium, 68. 221. 222, 223.
—— cochlea, 223.
—— fuscum, 223.
—— lineatum, 223.
—— Menkeanum, 190.
—— minimum, 40. 49. 219. 221.
—— personatum, 225.
—— politum, 222.
Cephalopodes, 73.
Chara aspera, 254.
Chilotrema lapicida, 140.
Chondrus secale, 197.
Cionella, 187.
—— acicula, 191.
—— lubrica, 188.
Clausilia, 66. 68. 110. 181. 189. 193. 207, 208, 209. 211.
—— bidens, 14. 46, 47. 103 212.
—— biplicata, 15. 24. 37. 50. 214.
—— dubia, 38. 53. 216, 217.
—— Everettii, 217.
—— fragilis, 207.
Clausilia Iphigenia Rolphii, 215.
—— labiata, 14.
—— lamellata, 213.
—— laminata, 213.
—— laminosa, 14.
—— Montagui, 214.
—— nigricans, 47. 216, 217, 218.
—— papillaris, 14, 15. 24.
—— parvula, 217, 218.
—— perversa, 217.
—— plicatula, 215, 216.
—— Rolphii, 26. 37. 46. 50. 215.
—— rugosa, 26. 216, 217, 218.
—— similis, 214. 216.
—— solida, 14.
—— ventricosa, 15. 214.
Clausiliæ, 193.
Clausium, 189. 208. 210.
Clio, 73.
Cobresia helicoides vitrea, 120.
Cochlea, 255.
—— fasciata, 131.
—— nuda, 113.
—— Pomatia, 135.
—— unifasciata, 138.
—— versicolor, 133.
—— vulgaris, 128.
Cochlicopa lubrica, 188.
Cochlodina similis, 214.
—— ventricosula, 214.
Cochlodonta secale, 198
Cochlohydra putris, 178.
Cochlostyla obtusa, 14.
Conchifera, 73. 277. 300.
Conchifers, 73.
Cones, 82.
Congeria, 300.
Conovulus, 68. 220, 221. 224.
—— albus, 50. 227, 228.
—— bidentatus, 50. 227.
—— coffee, 20.
—— denticulatus, 49. 219. 225. 228.
Corbulæ, 43.
Cornucopia, 129.
—— helicina, 129.
—— monstrosa, 129.
Crepidula, 248.
—— lacustris, 249.
—— oblonga, 250.
Cycladæ, 277.

Cyclas, 52. 57. 69. 279. 282.
—— æquata, 280.
—— amnica, 286.
—— angulata, 44.
—— appendiculata, 285.
—— calyculata, 17. 50. 281. 286.
—— compressa, 280.
—— cornea, 18. 41. 48. 278.
—— elongata, 44.
—— fontinalis, 284.
—— gibba, 284.
—— gibbosa, 280.
—— lacustris, 17. 25. 281.
—— major, 44.
—— media, 43.
—— membranacea, 43.
—— obliqua, 286.
—— obtusalis, 282, 283.
—— palustris, 286.
—— parva, 44.
—— pulchra, 43.
—— pusilla, 283.
—— rivicola, 34. 48. 279
—— stagnicola, 280, 281.
—— subquadrata, 44.
Cyclostoma, 67. 89. 222, 223. 274.
—— achatinum, 91.
—— acutum, 51. 88.
—— contectum, 91.
—— elegans, 46. 48. 54. 70. 273. 275.
—— ferrugineum, 18.
—— impurum, 93.
—— lineatum, 223.
—— lineolata, 274.
—— marmorata, 275.
—— obtusum, 97.
—— productum, 16.
—— simile, 51. 94.
—— sulcatum, 17.
—— viviparum, 90.
Cyclostomidæ, 102.
Cypræa, 193.
Cyrena, 287.
—— consobrina, 42.
—— trigonula, 42.

Damaris, 293.
Detracia bullæoides, 20.
Diatropha contorta, 16.
Dimyaria, 277.
Doubtful species, 5.
Dreissena, 69. 300.
—— polymorpha, 4. 299, 300, 301.
Dreissenadæ, 277. 299.
Drilus flavescens, 134.

Elisma, 185.
—— fasciata, 185.
Ena, 181.
—— montana, 182.
—— obscura, 183.
Enopthalma, 79.
Euglesa Henslowiana, 284.
Euglesia, 282.

Fusus Turtoni, 54.

Gasteropodes, 72. 77.
Genera, Table of, 66.
Geographical distribution, 24.
Gordius, 232.
Gulnaria, 232.
—— auricularia, 232.
—— lacustris, 234. 236.
—— peregra, 233.
Gymnobranchiata, 77.

Helices, 23. 198. 223. 229.
Helicidæ, 56. 101. 109. 164.
Helicina, 110.
Helicodontæ, 198.
Helicolimax Audebardii, 121.
—— elongatus, 9.
—— pellucidus, 120, 121.
Helicophanta brevipes, 9.
Heligona lapicida, 140.
Helix, 24. 66. 68. 86. 98. 100. 141. 177. 181.
—— aculeata, 49. 70. 142. 149, 150.
—— acuta, 12. 18. 140. 185. 196.
—— alba, 259, 260.
—— albella, 9. 163. 165, 166.
—— albina, 158.
—— arborea, 27.
—— Alderi, 148. 171.
—— alliacea, 169.
—— alliaria, 169.
—— aperta, 36. 53. 127.
—— arbustorum, 23. 45. 47. 137.

Helix aspersa, 11. 23. 27. 47. 128. 134.
—— auricularia, 232.
—— austriaca, 11. 143.
—— bidens, 212.
—— bidentata, 24.
—— bifasciata, 185.
—— bilabiata, 139.
—— brevipes, 9. 54. 174.
—— buccinata, 182.
—— bullæoides, 251, 252.
—— cæspitum, 11.
—— candidula, 10. 24, 25. 162.
—— cantiana, 27. 36. 45. 47. 103. 144.
—— caperata, 10. 45. 49. 161, 162.
—— carinata, 263.
—— Carthusiana, 36. 50. 144, 145, 146.
—— Carthusianella, 146.
—— castanea, 11.
—— cellaria, 170, 171.
—— cespitum, 163, 164.
—— cincta, 134.
—— cinctella, 144.
—— cingenda, 158. 161.
—— circinata, 143. 155.
—— cochlea, 141. 266.
—— cochlicella clavulus, 6.
—— cochlicella ventrosa, 12.
—— cochlitoma folliculus, 15.
—— cochlodina derugata, 212.
—— complanata, 263. 265.
—— concinna, 12. 52. 154, 155, 156.
—— conspurcata, 10. 24.
—— contorta, 270.
—— contortuplicata, 264.
—— cornea, 259.
—— costata, 142, 143.
—— crassa, 270.
—— crenella, 142.
—— crenulata, 162.
—— cristata, 99.
—— crystallina, 176.
—— decollata, 5.
—— delectabilis, 149.
—— depilata, 38. 53. 154, 155, 156.
—— detrita, 12. 18. 243.
Helix diaphana, 120.
—— disjuncta, 161.
—— Draparnaudi, 120. 265.
—— elegans, 9. 161. 167.
—— elliptica, 120.
—— erica, 163.
—— ericetorum, 11. 24. 26. 45, 46, 47. 163. 266.
—— excavata, 175.
—— exilis, 18.
—— explanata, 9.
—— fasciata, 134.
—— fascicularis, 97.
—— fœtida, 169.
—— folliculus, 15.
—— fontana, 269.
—— fossaria, 241, 242.
—— fragilis, 19, 237.
—— fruticum, 24, 25.
—— fulva, 24. 47. 148, 149.
—— fusca, 23. 25. 38. 40. 45. 50. 147. 152. 157.
—— fuscescens, 120.
—— Gibbsii, 10. 146.
—— glabella, 154, 155, 156, 157.
—— glabra, 169.
—— globosa, 42.
—— globularis, 151.
—— glutinosa, 244.
—— gracilis, 15.
—— granulata, 25. 50. 151. 153, 154. 156.
—— grisea, 128.
—— guadalupensis, 18.
—— Gypsii, 146.
—— Helmii, 173.
—— hispida, 10. 12. 40. 48. 151, 152, 153, 154, 155, 156. 157.
—— holosericea, 139, 140. 150.
—— hortensis, 25. 27. 40. 45. 47. 53. 56. 74. 128. 130, 131, 132. 134.
—— hyalina, 176.
—— hybrida, 45. 53. 132. 134.
—— incarnata, 24, 25. 144.
—— intersecta, 162.
—— irregularis, 7.
—— Isthmia cylindrica, 202.
—— Kirbii, 167.
—— Lackamensis, 182.
—— lamellata, 38. 52. 70. 150.
—— lamellosa, 142.

Helix lapicida, 47. 140. 266.
—— lenticularis, 269.
—— limacoides, 120.
—— limbata, 25. 34. 53. 143.
—— limosa, 178, 232. 234. 239.
—— lineata, 271.
—— lubrica, 188.
—— lucida, 170, 171. 174, 175, 176.
—— lucorum, 11. 128.
—— lutea, 234, 235.
—— lymnoides, 19.
—— maculosa, 7.
—— maritima, 161.
—— minuta, 27. 142.
—— Mortoni, 148.
—— muscorum, 196.
—— mutata, 11.
—— nana, 259.
—— naticoides, 127.
—— nautileus, 262.
—— neglecta, 11.
—— nemoralis, 11. 23. 26, 27. 45, 46, 56. 131, 132. 134.
—— neritoides, 127.
—— nitens, 169, 170, 171.
—— nitida, 120. 122. 169, 170. 175. 271.
—— nitidosa, 171.
—— nitidula, 148. 169. 171, 172, 173, 174.
—— obliterata, 163.
—— oblonga, 7.
—— obvoluta, 34. 52. 139.
—— octanfracta, 242.
—— octona, 191. 242.
—— Oliveri, 10. 147.
—— pallida, 145.
—— paludosa, 40. 142.
—— palustris, 239.
—— papillaris, 14.
—— pellucida, 120.
—— peregra, 233.
—— peregrina, 242.
—— perversa, 214. 216, 217.
—— petholata, 158.
—— Pisana, 24, 25. 27. 37. 45. 48. 158. 160.
—— piscinalis, 97.
—— planata, 262.
—— planorbis, 263. 265. 267.
—— plebeia, 12.
Helix Pomatia, 35. 44. 46. 126 131. 135, 136.
—— pulchella, 24. 26, 27. 49. 141, 142, 143.
—— pupa, 13.
—— pura, 171, 172.
—— putris, 178, 179. 233.
—— pygmea, 24. 167, 168.
—— radiata, 12. 165.
—— radiatula, 9. 171, 172. 174.
—— revelata, 36. 53. 152.
—— rhodostoma, 158.
—— rhombea, 265, 266.
—— rotundata, 24. 165.
—— rufescens, 25. 40. 46. 139. 145. 154, 155, 156.
—— rufilabris, 146, 147.
—— rupestris, 45. 166.
—— scalaris, 136.
—— Scarburgensis, 150.
—— sepium, 12.
—— septemdentata, 204.
—— sericea, 53. 151, 152. 153. 156.
—— serpuloides, 100.
—— Somershamensis, 260.
—— spinulosa, 149.
—— spirorbis, 259, 260. 268.
—— stagnalis, 139. 237. 239.
—— striata, 10. 160. 162.
—— striatula, 174.
—— strigata, 158.
—— strigella, 24, 25.
—— subalbida, 160.
—— subcylindrica, 22. 188.
—— subrufescens, 147.
—— succinea, 178.
—— sylvatica, 11. 134.
—— tentaculata, 93.
—— tenuis, 175.
—— terebra, 141. 266.
—— trigonophora, 139.
—— trochiformis, 40. 148.
—— Trochilus, 148.
—— Trochulus, 148.
—— truncatula, 241.
—— Turtoni, 165.
—— turturum, 133.
—— umbilicata, 49. 166. 168. 270.
—— variabilis, 160.
—— ventricosa, 91. 184. 198.

Helix Vindobonensis, 11.
—— virgata, 11. 27. 36. 45. 47 147. 158. 160. 176. 186.
—— vitrina, 174.
—— vivipara, 90, 91.
—— vortex, 267.
—— zebra, 7.
—— Zenobia bimarginata, 147.
—— Zenobia corrugata, 147.
—— zonaria, 48. 158. 160.
Hemithalamus lacustris, 271.
Hyalina pellucida, 120.
Hyalinæ, 165.
Hydrobia, 88. 95, 96.
Hydromanes, 96. 143. 156.

Introduction, 1.
Iphigenia, 214.
Iridinæ, 300.
Isthmia, 199.

Jaminia edentula, 200.
—— heterostropha, 205.
—— marginata, 196.
—— muscorum, 194.

Lacuna, 242.
Lapicida, 141.
Latomus lapicida, 140.
Lauria, 193.
Leuconia, 227.
Limacella concava, 106. 114.
—— obliqua, 117.
—— Parma, 113.
—— variegata, 107. 115.
Limacellus obliquus, 117.
—— Parma, 113.
—— unguiculus, 116.
Limacidæ, 56. 103.
Limacina, 111.
Limax, 40. 66. 73. 109. 111. 177. 238.
—— agrestis, 45. 47. 107, 108. 117, 118.
—— antiquorum, 103. 113.
—— ater, 105. 113.
—— brunneus, 37. 117, 118.
—— carinatus, 25. 52. 115, 116.
—— cinereo-niger, 113.
—— cinereus, 113.
—— fasciatus, 107. 113.
—— filans, 112. 117.
Limax flavus, 47, 114.
—— hortensis, 107.
—— luteus, 105.
—— maculatus, 113.
—— marginatus, 108.
—— marginellus, 105.
—— maximus, 45, 46. 112, 113. 115.
—— minimus, 42.
—— rufus, 105.
—— Sowerbii, 115. 116.
—— subfuscus, 106, 107.
—— succineus, 105.
—— succino colore, 114.
—— tenellus, 24.
—— unguiculus, 116.
—— variegatus, 114.
Limnea elongata, 242.
—— fontinalis, 251.
—— glutinosa, 244.
—— lineata, 54. 234, 235, 236.
—— palustris, 239, 240.
—— succinea, 178.
—— turrita, 255.
Limnæadæ, 219. 229. 248.
Limnæidæ, 102. 248. 219. 257.
Limnæus, 67. 74. 127. 177. 181. 224. 230, 231. 243. 248. 255, —256. 278.
—— acutus, 34.
—— auricularius, 40.
—— columellaris, 42.
—— fossarius, 26. 180. 240, 241.
—— glaber, 26. 39, 40. 48. 242.
—— longiusculus, 42.
—— maximus, 42.
—— palustris, 26. 48. 239.
—— pereger, 26, 34. 40. 48. 179. 249.
—— pyramidalis, 42.
—— scaturiginum, 51.
—— stagnalis, 26. 46. 51. 254.
—— truncatulus, 40. 50. 240, 241.
Limneus communis, 239.
—— elongatus, 242.
—— fragilis 237.
—— glutinosus, 244. 246.
—— involutus, 245.
—— minutus, 240, 241.
—— tinctus, 239.
Limnophysa minuta, 241.

Littorina, 85. 87. 89. 95.
—— muriatica, 88.
—— ulvæ, 24 88.
—— ventricosa, 95.
Lottia, 69.
Lucena pulchella, 142.
Lutea, 243.
Lymnæa auricularia, 232. 236.
—— fasciata, 185.
—— leucostoma, 242.
—— lubrica, 188.
—— minuta, 241.
—— ovata, 234.
—— peregra, 233.
—— putris, 233.
Lymnæus pereger, 233.
—— vulgaris, 233. 236.
Lymnea fontinalis, 97.
—— fossaria, 226. 241.
—— fragilis, 239.
—— lacustris, 234.
—— marginata, 234.
—— tentaculata, 93.
—— truncatula, 232.
Lymneadæ, 56.
Lymneus acutus, 234. 236.
—— auricularius, 219. 232.
—— detritus, 18.
—— fragilis, 20.
—— glaber, 15. 18.
—— glutinosus, 246.
—— Grayanus, 86.
—— major, 237.
—— minutus, 241.
—— ovatus, 234.
—— pereger, 234. 236.
—— speciosus, 238.
—— stagnalis, 15. 19. 23. 236. 237. 240.

Macroceramus signatus, 20. 187.
Melampus, 59. 226.
—— ovulum, 21.
Melania, 44. 85.
—— costata, 43.
—— fasciata, 42.
—— helvetica, 44.
—— Matonii, 22.
—— virginica, 44.
Melaniadæ, 79. 85.
Melanopsis, 44. 85.
—— attenuata, 43.
Melanopsis brevis, 43.
—— carinata, 43.
—— tricarinata, 43.
Mollusca, classes of, 72.
—— Brachiata, 73.
—— Reptantia, 73.
—— Subsilientia, 73.
Molluscans, crawling, 77.
Murex fuscatus, 22.
Mya, 43.
—— Batava, 296.
—— margaritifera, 293.
—— ovalis, 298.
—— ovata, 296. 298.
—— pictorum, 295, 296.
Mysca Batava, 296.
—— ovata, 298.
—— pictorum, 295.
—— solida, 296. 298.
Mytilus, 61. 299, 300. 302.
—— anatinus, 290, 291, 292.
—— arca, 301.
—— cellensis, 289.
—— Chemnitzii, 301.
—— cygneus, 289, 290, 291, 292, 293.
—— dentatus, 290.
—— edulis, 84.
—— Hagenii, 301.
—— incrassatus, 291. 293.
—— lineatus, 301.
—— maculatus, 290. 293.
—— piscinalis, 290.
—— polymorphus, 301, 302.
—— stagnalis, 290.
—— Toreyi, 301.
—— Volgæ, 301.
—— Volgensis, 301.
Myxas Mülleri, 244.

Nanina, 164.
Nauta hypnorum, 255.
Nautili, 229.
Nautilus lacustris, 193. 271.
Navicella, 80.
Nerita, 80, 81. 97.
—— aperta, 43.
—— elegans, 275.
—— fasciata, 90.
—— fluviatilis, 83.
—— globosa, 43.
—— globulosa, 95.

Nerita jaculator, 93.
—— piscinalis, 97.
—— sphærica, 93.
—— Syncera hepatica, 86.
—— valvata, 99.
—— vivipara, 90.
Neritidæ, 79, 80.
Neritina, 34. 68. 81.
—— Dalmatica, 83.
—— declivis, 22.
—— Fittonii, 43.
—— fluviatilis, 33. 47. 78. 83.
—— fontinalis, 83.
—— virginea, 22.
—— viridis, 81.
Nux nigella, 280.

Odostomia Carychium, 221.
—— muscorum, 194.
—— nigricans, 217.
—— perversa, 207.
Onchidiadæ, 56.
Opercula, 78.
Operculata, 272.
Ossicula, 209.
Ovatella, 225.

Paludina, 19. 34. 41. 44 67. 89, 90. 96.
—— achatina, 23. 26. 33. 47. 87. 91.
—— acuta, 94, 95.
—— Balthica, 24
—— carinifera, 43.
—— concinna, 43.
—— crystallina, 26. 33. 90.
—— elongata, 43.
—— fasciata, 91.
—— fluviorum, 43.
—— Grayana, 86.
—— humilis, 94.
—— impura, 93.
—— lenta, 43.
—— octona, 24.
—— similis, 24. 94, 95.
—— stagnorum, 95.
—— Sussexensis, 43.
—— tentaculata, 93.
—— ventricosa, 94.
—— viridis, 95.
—— vivipara, 27. 33. 47. 78. 90.
—— vulgaris, 91.
Paludinidæ, 79. 89.
Patella, 69. 80. 229. 247. 249.
—— fluviatilis, 249.
—— lacustris, 249, 250.
——oblonga, 250.
Pedipes, 21. 59.
Pera, 282.
—— appendiculata, 285.
—— fluviatilis, 286.
—— gibba, 282.
—— Henslowiana, 285, 286.
—— pulchella, 284.
Phasianella, 81.
—— angulosa, 43.
—— minuta, 43.
—— orbicularis, 43.
Philodromus Limacum, 114.
Physa, 15. 67. 74. 212. 230, 231. 248. 251. 255.
—— alba, 16. 62. 251. 254.
—— acuta, 16. 251. 254.
—— contorta, 16.
—— disciformis, 16.
—— fontinalis, 16. 48. 219. 245. 251, 252. 254.
—— hypnorum, 255.
—— marmorata, 21.
—— rivalis, 251. 253.
—— rivularis, 16.
—— scaturiginum, 15. 238.
—— subopaca, 251. 253.
Physina, 251.
Phytophaga, 77, 78.
Pisidium, 26. 52. 57. 69. 279. 282.
—— amnicum, 41. 49. 285, 286, 287, 288.
—— cinereum, 23. 38. 53. 286.
—— fontinale, 284.
—— Henslowianum, 23. 34. 51. 285,
—— Jenynsii, 285.
—— nitidum, 23. 34. 52. 283.
—— obliquum, 41. 286.
—— obtusale, 34. 52. 282.
—— pulchellum, 23. 52. 284, 285.
—— pusillum, 41. 51. 283, 284.
Planorbis, 68. 99. 127. 230. 255, 256, 257, 258. 271.
—— albus, 48. 70. 219. 259, 260 261. 266.

Planorbis bulla, 251.
—— carinatus, 41. 50, 51. 262, 263, 264, 265.
—— clausulatus, 271.
—— complanatus, 263, 264, 265, 266. 269.
—— compressus, 267.
—— contortus, 41. 48. 270.
—— corneus, 33. 41. 48. 258.
—— cristatus, 262.
—— cylindricus, 42.
—— deformis, 266.
—— disciformis, 263, 264
—— Draparnaldi, 265, 266.
—— euomphalus, 42.
—— fontanus, 269. 271, 272.
—— glaber, 23. 259. 260.
—— hispidus, 259.
—— imbricatus, 41. 49. 261.
—— lævis, 24. 26. 38. 53. 261.
—— lens, 42.
—— lenticularis, 269.
—— leucostomus, 267.
—— lutescens, 16. 263.
—— marginatus, 48. 257. 263, 264, 265.
—— nitidus, 41, 49. 268, 269. 271.
—— obtusus, 42.
—— parvus, 261.
—— planatus, 263, 264.
—— purpureus, 259.
—— reticulatus, 259.
—— rhombeus, 265.
—— Sheppardi, 265, 266.
—— similis, 259.
—— spirorbis, 49. 257. 261. 268.
—— turgidus, 265.
—— turritus, 255.
—— umbilicatus, 265.
—— vortex, 41. 48. 157. 267, 268.
Pleurobranchi, 247.
Pleurobranchiata, 77.
Pneumobranchiata, 77.
Podophthalma, 79.
Pomatia antiquorum, 135.
—— Dioscoridis, 127.
Potamides, 44. 85.
—— acutus, 43.
—— cinctus, 43.
—— duplex, 43.
—— magnilucens, 43.
Potamides pliculus, 43.
—— ventricosus, 43.
Psammobiæ, 43.
Pteropodes, 73.
Pulmonifera, 248.
Pupa, 66. 68. 110. 181. 192. 199. 207.
—— alpestris, 14. 201.
—— anglica, 26. 38. 51. 193. 195.
—— antivertigo, 204.
—— bidentata, 195. 197.
—— Britannica, 189.
—— cinerea, 13.
—— costulata, 24.
—— Draparnaudii, 194.
—— edentula, 38. 193, 194. 199.
—— fragilis, 207.
—— germanica, 14.
—— Goodalli, 189.
—— juniperi, 37. 46. 50. 197.
—— labiata, 207.
—— marginata, 40. 45. 50. 193. 196, 197.
—— minuta, 201.
—— minutissima, 201.
—— muscorum, 196. 201. 204.
—— normalis, 13.
—— obtusa, 14. 200, 201.
—— pygmæa, 201.
—— ringens, 195.
—— secale, 197.
—— sexdentata, 40. 193. 203.
—— substriata, 203.
—— tridens, 13.
—— tridentalis, 195.
—— tridentata, 14.
—— umbilicata, 25. 47. 193, 194.
—— unidentata, 197.
—— vertigo, 205.
Pupilla, 196.
Pyrula perversa, 212.

Radix, 232.
—— auriculatus, 232.
Rissoa, 96.

Scalaris, 266.
Scarabus, 221.
Segmentina, 68. 230. 269. 271.
—— lineata, 25. 34. 49. 271.

Segmentina nitida, 271.
Sepia, 73.
Serpula cornucopia, 129.
—— helicina, 129.
Sidula, 21.
—— felis Catti, 21.
Siphonaria, 247.
Skenia, 96.
Stagnicola, 239.
—— communis, 239.
—— elegans, 237.
—— minuta, 241.
—— octanfracta, 242.
—— vulgaris, 237.
Stenopus, 164.
Strombi, 193.
Strombiformis perversus, 14.
Succinea, 67. 110. 117. 125, 126. 177.
—— amphibia, 40. 55. 178, 179.
—— gracilis, 179.
—— intermedia, 179.
—— Levantina, 179.
—— Mülleri, 178.
—— oblonga, 37. 52. 179, 180.
—— Pfeifferi oblonga, 40. 52. 179.
—— putris, 26. 47. 178, 179, 180.

Tachea hortensis, 131.
—— nemoralis, 133, 134.
Tapada, 127.
—— putris, 178, 179.
Teba Cantiana, 144.
—— caperata, 162.
—— cingenda, 158.
—— fulva, 148, 149.
—— hispida, 151, 152.
—— rufescens, 156, 157.
—— spinulosa, 149.
Teeth, growth of, 198.
Tellina amnica, 285.
—— cornea, 279, 280.
—— Henslowiana, 285.
—— lacustris, 281.
—— pusilla, 283.
—— rivalis, 59. 280. 286.
—— stagnicola, 280.
Terms of shells, 70.
Testacella, 110. 122. 276.
—— europæa, 124.
—— Galliæ, 124.
Testacella haliotoidea, 34. 45. 103. 124.
—— Maugei, 5.
—— scutulum, 124, 125.
Testacellina, 109.
Testacellus, 66. 122.
—— europæus, 5.
—— haliotideus, 124.
—— Maugei, 5.
—— scutulum, 55.
Theodoxus Lutetianus, 83.
Tichogonia, 300.
—— Chemnitzii, 301.
Tornatella bullæoides, 20.
Torquilla secale, 197.
Tralia pusilla, 21.
Trigonostoma, 139.
Trochus, 98. 192.
—— terrestris, 9. 148.
Truncatella, 59. 223.
—— subcylindrica, 22.
—— truncata, 22.
Turbo, 81. 96. 229.
—— achatinus, 91.
—— Anglicus, 195.
—— auricularis, 242.
—— bidens, 14. 217.
—— bidentatus, 225.
—— biplicatus, 214.
—— Carychium, 221
—— chrysalis, 196.
—— cristatus, 99.
—— cylindraceus, 194.
—— edentulus, 200.
—— elegans, 275.
—— fasciatus, 185.
—— fontinalis, 96, 97.
—— formosus, 20.
—— Francesia, 86.
—— fulvus, 16.
—— fuscus, 223.
—— glaber, 188.
—— helicinus, 142.
—— juniperi, 197.
—— labiatus, 14.
—— lævis, 98.
—— Leachii, 94.
—— marginatus, 196.
—— muriaticus, 88.
—— muscorum, 194. 200.
—— nautileus, 262.
—— nucleus, 98.

Turbo Offtonensis, 199.
—— paludosus, 142.
—— perversus, 207. 217.
—— quadridens, 13.
—— quinquedentatus, 13.
—— rupium, 188.
—— sexdentatus, 202, 203.
—— striatus, 275.
—— thermalis, 97.
—— trianfractus, 178.
—— tridens, 13, 14. 189. 222.
—— truncatus, 276.
—— tumidus, 275.
—— vertigo, 50. 206.

Unio, 34. 44. 69. 82. 289. 293. 300.
—— aduncus, 44.
—— ambiguus, 44.
—— ater, 25.
—— Batavus, 34. 50. 296. 298.
—— compressus, 44.
—— cordiferus, 44.
—— crassus, 25.
—— elongatula, 296.
—— elongatus, 294.
—— Gaulterii, 43.
—— limosus, 25.
—— littoralis, 25. 42.
—— Mantellii, 43.
—— margaritifer, 294.
—— margaritifera, 27. 294.
—— margaritiferus, 293, 294.
—— Martini, 43.
—— ovalis, 296. 302.
—— ovatus, 50.
—— pictorum, 31. 41. 48. 295, 296, 297, 298.
—— porrectus, 44.
—— riparia, 294.
—— Roissyi, 294.
—— rostratus, 295. 298.
—— sinuata, 294.
—— Solandri, 43.
—— subtruncatus, 43.
—— tumidus, 34. 48. 296. 298.
Unionidæ, 277. 288. 296.

Vallonia, 143.
—— Rosalia, 142.
Valvata, 67, 68. 97. 143.
—— antiqua, 41.
Valvata cristata, 17. 41. 49. 78. 98, 99, 100. 261.
—— depressa, 97, 98.
—— minuta, 17. 97. 99, 100.
—— obtusa, 48. 97. 287.
—— piscinalis, 41. 97, 98. 100.
—— planorbis, 54. 99.
—— spinorbis, 17. 199.
Valvatidæ, 79. 96.
Velletia, 66. 70. 230. 250.
—— lacustris, 41. 49. 250.
Veneridæ, 278.
Verticellatæ, 165.
Vertigo, 68. 110. 199. 205. 207.
—— alpestris, 26. 38. 53. 202.
—— anglica, 195.
—— angustior, 23. 26. 37. 50. 205, 206.
—— cylindrica, 52. 200, 201.
—— edentula, 51.
—— heterostropha, 205.
—— Montagua, 204.
—— nitida, 199.
—— palustris, 26. 37. 52. 203, 204.
—— pusilla, 52. 205, 206.
—— pygmæa, 52. 201, 202, 203, 204.
—— quatuor, quinque dentata, 203.
—— secale, 197.
—— sexdentata, 203.
—— similis, 203.
—— substriata, 50. 202, 203, 204.
—— vulgaris, 201.
Vesicula multifida, 101. 125. 132. 134.
Vitrina, 66. 74. 109. 118. 122. 125. 174.
—— beryllina, 120.
—— depressa, 120.
—— diaphana, 121.
—— Dillwynii, 120, 121, 122.
—— Draparnaudi, 120, 121, 122.
—— elongata, 9. 120. 122.
—— margaritacea, 122.
—— membranacea, 122.
—— Mülleri, 120.
—— pellucida, 48. 103. 120. 123.
Vitrinina, 109.
Vitrinus pellucidus, 120.
Viviparus fluviorum, 91.

Voluta alba, 227.
—— bidentata, 227.
—— bullæoides, 20.
—— coffee, 20.
—— denticulata, 54. 220. 225, 226.
—— hyalina, 226.
—— reflexa, 225.
—— ringens, 225.
—— triplicata, 21.
Volvaria alba, 228.

Zonites, 54. 66. 110. 119. 122. 125. 164. 177.
—— alliarius, 51. 168. 175.
—— cellarius, 26. 169, 170. 173. 175.
—— crystallinus, 51. 172. 176.
Zonites ericetorum, 163.
—— excavatus, 25. 32. 38. 175.
—— lucidus, 40. 51. 170, 171. 174. 176.
—— nitens, 48.
—— nitidulus, 51. 175.
—— nitidus, 27. 139. 169. 172.
—— purus, 25. 38. 52. 171.
—— pygmæus, 51. 167.
—— radiatulus, 25, 26. 47. 51. 165. 173, 174.
—— rotundatus, 165, 166.
—— umbilicatus, 166.
Zoophaga, 77.
Zua, 68. 110.
—— lubrica, 24. 40. 47. 188.
Zurama, 141.
—— pulchella, 142

THE END.

London:
Printed by A. Spottiswoode,
New-Street-Square.

March 31, 1845.

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,, ,, Porcelain & Glass	24
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,, Recent Improvements in Arts, Manufactures, and Mines - -	31

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,, Scientific and Literary Treasury	22
,, Treasury of History - -	22
,, Biographical Treasury - -	22
,, Universal Class-Book - -	22
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Riddle's English-Latin and Latin-English Dictionaries - - - - - - -	25
Short Whist - - - - - - -	27
Thomson's Domestic Management of the Sick Room - - -	29
,, Interest Tables - - -	30
Tomlins' Law Dictionary - - - -	30
Webster's Ency. of Domestic Economy -	32

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